

2025 CFA[®]

Exam Prep

SchweserNotes[™]

Portfolio Construction and
Performance Measurement

Level III Book 2

KAPLAN  **SCHWESER**

Book 2: Portfolio Construction and Performance Measurement

SchweserNotes™ 2025

Level III CFA®



SCHWESERNOTES™ 2025 LEVEL III CFA® BOOK 2: PORTFOLIO CONSTRUCTION AND PERFORMANCE
MEASUREMENT

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Learning Outcome Statements (LOS)

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- b. describe how an equity manager's investment universe can be segmented.
- c. describe the types of income and costs associated with owning and managing an equity portfolio and their potential effects on portfolio performance.
- d. describe the potential benefits of shareholder engagement and the role an equity manager might play in shareholder engagement.
- e. describe rationales for equity investment across the active management spectrum.
- f. discuss considerations in choosing a benchmark for an equity portfolio.

7. Overview of Fixed-Income Portfolio Management

The candidate should be able to:

- a. discuss roles of fixed-income securities in portfolios and how fixed-income mandates may be classified.
- b. describe fixed-income portfolio measures of risk and return as well as correlation characteristics.
- c. describe bond market liquidity, including the differences among market sub-sectors, and discuss the effect of liquidity on fixed-income portfolio management.
- d. describe and interpret a model for fixed-income returns.
- e. discuss the use of leverage, alternative methods for leveraging, and risks that leverage creates in fixed-income portfolios.
- f. discuss differences in managing fixed-income portfolios for taxable and tax-exempt investors.
- g. describe liability-driven investing.
- h. describe the strategy of cash flow matching.
- i. describe construction, benefits, limitations, and risk-return characteristics of a laddered bond portfolio.

8. Asset Allocation to Alternative Investments

The candidate should be able to:

- a. explain the roles that alternative investments play in multi-asset portfolios.
- b. compare alternative investments and bonds as risk mitigators in relation to a long equity position.
- c. compare traditional and risk-based approaches to defining the investment opportunity set, including alternative investments.
- d. discuss investment considerations that are important in allocating to different types of alternative investments.
- e. discuss suitability considerations in allocating to alternative investments.
- f. discuss approaches to asset allocation to alternative investments.
- g. discuss the importance of liquidity planning in allocating to alternative investments.
- h. discuss considerations in monitoring alternative investment programs.

9. An Overview of Private Wealth Management

The candidate should be able to:

- a. discuss the different types of individual wealth and how wealth is created and distributed globally.
- b. evaluate how changes in human capital, financial capital, and economic net worth across the financial stages of an individual's life influence their financial decision making.
- c. justify how returns, risks, objectives, and constraints for individuals relate to their human and financial capital.
- d. evaluate how various types of taxes imposed on individual investors and the impact of inflation influence investment decisions.
- e. discuss the differences between private and institutional clients and formulate an appropriate Investment Policy Statement for private clients.

10. Portfolio Management for Institutional Investors

The candidate should be able to:

- a. discuss common characteristics of institutional investors as a group.
- b. discuss investment policy of institutional investors.
- c. discuss the stakeholders in the portfolio, the liabilities, the investment time horizons, and the liquidity needs of different types of institutional investors.
- d. describe the focus of legal, regulatory, and tax constraints affecting different types of institutional investors.
- e. evaluate risk considerations of private defined benefit (DB) pension plans in relation to 1) plan funded status, 2) sponsor financial strength, 3) interactions between the sponsor's business and the fund's investments, 4) plan design, and 5) workforce characteristics.
- f. evaluate the investment policy statement of an institutional investor.
- g. evaluate the investment portfolio of a private DB plan, sovereign wealth fund, university endowment, and private foundation.
- h. describe considerations affecting the balance sheet management of banks and insurers.

11. Trading Costs and Electronic Markets

The candidate should be able to:

- a. explain the components of execution costs, including explicit and implicit costs.
- b. calculate and interpret effective spreads and VWAP transaction cost estimates.
- c. describe the implementation shortfall approach to transaction cost measurement.
- d. describe factors driving the development of electronic trading systems.
- e. describe market fragmentation.
- f. identify and contrast the types of electronic traders.
- g. describe characteristics and uses of electronic trading systems.
- h. describe comparative advantages of low-latency traders.
- i. describe the risks associated with electronic trading and how regulators mitigate them.
- j. describe abusive trading practices that real-time surveillance of markets may detect.

12. Case Study in Portfolio Management: Institutional (SWF)

The candidate should be able to:

- a. discuss financial risks associated with the portfolio strategy of an institutional investor.
- b. discuss environmental and social risks associated with the portfolio strategy of an institutional investor.
- c. analyze and evaluate the financial and non-financial risk exposures in the portfolio strategy of an institutional investor.
- d. discuss various methods to manage the risks that arise on long-term direct investments of an institutional investor.
- e. evaluate strengths and weaknesses of an enterprise risk management system and recommend improvements.
- e. evaluate strengths and weaknesses of an enterprise risk management system and recommend improvements.

13. Portfolio Performance Evaluation

The candidate should be able to:

- a. explain the following components of portfolio evaluation and their interrelationships: performance measurement, performance attribution, and performance appraisal.
- b. describe attributes of an effective attribution process.
- c. contrast return attribution and risk attribution; contrast macro and micro return attribution.
- d. describe returns-based, holdings-based, and transactions-based performance attribution, including advantages and disadvantages of each.
- e. interpret the sources of portfolio returns using a specified attribution approach.
- f. interpret the output from fixed-income attribution analyses.
- g. discuss considerations in selecting a risk attribution approach.
- h. identify and interpret investment results attributable to the asset owner versus those attributable to the investment manager.
- i. discuss uses of liability-based benchmarks.
- j. describe types of asset-based benchmarks.
- k. discuss tests of benchmark quality.

- l. describe the impact of benchmark misspecification on attribution and appraisal analysis.
- m. describe problems that arise in benchmarking alternative investments.
- n. calculate and interpret the Sortino ratio, the appraisal ratio, upside/downside capture ratios, maximum drawdown, and drawdown duration.
- o. describe limitations of appraisal measures and related metrics.
- p. evaluate the skill of an investment manager.

14. Investment Manager Selection

The candidate should be able to:

- a. describe the components of a manager selection process, including due diligence.
- b. contrast Type I and Type II errors in manager hiring and continuation decisions.
- c. describe uses of returns-based and holdings-based style analysis in investment manager selection.
- d. describe uses of the upside capture ratio, downside capture ratio, maximum drawdown, drawdown duration, and up/down capture in evaluating managers.
- e. evaluate a manager's investment philosophy and investment decision-making process.
- f. discuss how behavioral factors affect investment team decision making, and recommend techniques for mitigating their effects.
- g. evaluate the costs and benefits of pooled investment vehicles and separate accounts.
- h. compare types of investment manager contracts, including their major provisions and advantages and disadvantages.
- i. describe the three basic forms of performance-based fees.
- j. analyze and interpret a sample performance-based fee schedule.

15. Overview of the Global Investment Performance Standards

The candidate should be able to:

- a. discuss the objectives and scope of the GIPS standards and their benefits to prospective clients and investors, as well as investment managers.
- b. explain the fundamentals of compliance with the GIPS standards, including the definition of the firm and the firm's definition of discretion.
- c. discuss requirements of the GIPS standards with respect to return calculation methodologies, including the treatment of external cash flows, cash and cash equivalents, and expenses and fees.
- d. explain the recommended valuation hierarchy of the GIPS standards.
- e. explain requirements of the GIPS standards with respect to composite return calculations, including methods for asset-weighting portfolio returns.
- f. explain the meaning of "discretionary" in the context of composite construction and, given a description of the relevant facts, determine whether a portfolio is likely to be considered discretionary.
- g. explain the role of investment mandates, objectives, or strategies in the construction of composites.
- h. explain requirements of the GIPS standards with respect to composite construction, including switching portfolios among composites, the timing of the inclusion of new portfolios in composites, and the timing of the exclusion of terminated portfolios from composites.
- i. explain requirements of the GIPS standards with respect to presentation and reporting.
- j. explain the conditions under which the performance of a past firm or affiliation may be linked to or used to represent the historical performance of a new or acquiring firm.
- k. discuss the purpose, scope, and process of verification.

READING 6

OVERVIEW OF EQUITY PORTFOLIO MANAGEMENT

EXAM FOCUS

This reading provides candidates with an overview of equity portfolio management. Candidates are expected to know the roles of equities in their clients' portfolios. Candidates also need to be familiar with their clients' constraints, which may include ESG considerations. In addition, we present the three main approaches on how an equity manager's investment universe may be segmented. This reading continues with a discussion regarding the types of income and costs associated with managing an equity portfolio and how these costs may affect portfolio performance. Next, we will turn our attention to the potential benefits of shareholder engagement. Shareholder engagement refers to shareholders and managers seeking to influence the companies they invest in through calls and/or shareholder voting. Lastly, this reading focuses on the considerations in choosing the proper benchmark to evaluate portfolio performance.

MODULE 6.1: EQUITY INVESTMENT ROLES



Video covering this content is available online.

LOS 6.a: Describe the roles of equities in the overall portfolio.

Within the overall investment portfolio, equity securities play several beneficial roles. These roles include capital appreciation, dividend income, diversification, and the potential to hedge inflation.

Capital Appreciation

The main driver of long-term equity returns is capital (or price) appreciation. Capital appreciation results from investing in companies that are experiencing growth in cash flows, revenues, and/or earnings. These companies range from small technology companies that are focused on growth opportunities to large, well-established companies that are focused on value-added acquisitions and minimizing costs.

In the last 50 years, equity returns on average have been higher than bonds and bills. In general, equities tend to outperform other major asset classes during periods of strong economic growth, and underperform during periods of weak economic growth.

Dividend income: This is an important component of equity return. When companies generate excess cash flows, they can decide to either reinvest those cash flows in value-

added projects or distribute them to investors in the form of *dividends*. Well-established companies often pay dividends to investors and those dividends may increase over time. However, dividend payments are not guaranteed to increase or even continue into the future. Typical recent annual dividend yields have been 1%–3%. Dividend yield tends to be more stable than return due to price change.

Diversification: Equity securities offer diversification benefits due to less than perfect (i.e., less than +1.0) correlation with other asset classes. When assets are less than perfectly correlated, portfolio standard deviation will be lower than the weighted sum of the individual asset standard deviations.

However, the risk reduction is not constant. During a financial crisis correlations tend to increase, limiting the diversification benefit. In addition, asset class standard deviations could increase, further reducing the expected reduction in portfolio risk.

Inflation hedge: In some cases, individual equities or equity sectors may provide a hedge against inflation. A company that can charge its customers more when input costs increase (due to inflation), can provide an inflation hedge by increasing to cash flow and earnings as prices increase. Commodity-producing companies (e.g., oil producer) may also benefit directly from commodity price increases.

The general record for equities as an inflation hedge is mixed. Studies generally show positive correlation between equity real returns and inflation, but the relationship varies over time and by country. Other studies show that equities and inflation become negatively correlated during periods of hyperinflation. In addition, equity prices are typically a leading economic indicator while inflation is a lagging economic indicator; also suggesting a less than perfect correlation between equity return and inflation.

Client Investment Considerations

The decision to include equities or the kinds of equities to include in a portfolio also depends on client investment considerations as outlined in the investment policy statement (IPS). Clients with a high risk tolerance may prefer growth-oriented companies, while clients with a low risk tolerance may prefer stable, well-established companies that pay dividends.

Client constraints may include environmental, social, and governance (ESG) considerations and religious beliefs. Portfolio managers can address these constraints by using the following:

- **Negative screening** (i.e., exclusionary screening), which excludes companies or sectors that do not meet client standards. For example, a client may wish to exclude investments in the oil and gas industry.
- **Positive screening** (i.e., best-in-class screening), which seeks to uncover companies or sectors that rank most favorably with clients. For example, a client may wish to overweight companies that exhibit strong governance practices.

Most recently, ESG integration has become the dominate sustainable investment strategy. In addition to maximizing financial performance, many investors are now looking to achieve a more qualitative aspect to their portfolio by aligning their

investment choices to their values while at the same time aiming for a sustainable world and making a positive contribution to society. In all aspects of the investment process, asset managers can use ESG integration to analyze security valuation, determine expected returns, conduct risk analysis, and construct a complete sustainable portfolio.

Other approaches to ESG investing include thematic investing and impact investing.

Thematic investing screens equities based on a specific theme, such as climate change.

Impact investing aims to meet an investor's objectives by becoming more actively engaged with company matters and/or directly investing in company projects with the explicit intention of generating a positive social and environmental impact alongside a financial return.

Equity Investment Segmentation

LOS 6.b: Describe how an equity manager's investment universe can be segmented.

The three main **segmentation** approaches include size and style, geography, and economic activity. Using these approaches provides a better understanding of how equity investments integrate into the overall portfolio and enhance diversification benefits.

Size and Style

- Size, typically measured by market capitalization, can be categorized by large-cap, mid-cap, or small-cap companies.
- Style can be categorized by growth or value companies, or a mix of these two styles (sometimes referred to as *blend* or *core*). Investment style can be determined by analyzing company metrics, such as price-to-earnings ratios, price-to-book ratios, dividend yield, and earnings and/or book value growth.

A style box can be used to rank (or *score*) companies or portfolios among these metrics. An example is shown in Figure 6.1.

Figure 6.1: Equity Investment Style Box

		Style		
		Value	Blend	Growth
Size	Large	Large-cap value	Large-cap blend	Large-cap growth
	Medium	Mid-cap value	Mid-cap blend	Mid-cap growth
	Small	Small-cap value	Small-cap blend	Small-cap growth

It may be beneficial for portfolio managers to analyze exactly where each company falls within the nine size/style boxes (e.g., create a scatterplot of each investment within an equity index). For example, when comparing two equities within the large-cap value box, a scatterplot may reveal that one of these companies has a higher market cap and is solidly valued while the other may be closer to medium-cap and a blend

investment style. Managers can also break the nine boxes into additional equity style classifications such as micro-cap growth.

Advantages to segmenting by size and style include:

- Portfolio managers can better address client investment considerations in terms of risk and return characteristics.
- The potential for greater diversification benefits by investing across different sectors or industries.
- The ability to construct relevant benchmarks for funds that invest in a specific size/style category.
- The ability to analyze how company characteristics change over time. For example, as a small-cap growth company matures it may move into the mid-cap or large-cap categories and shift towards blended from pure growth.

The last advantage is also a disadvantage in that the categories are not stable over time.

Geography

This approach categorizes international markets by stage of economic development, such as developed markets, emerging markets, and frontier markets. Examples for each economic development stage include the following:

- *Developed markets*: United States, United Kingdom, Germany, Australia, and Japan.
- *Emerging markets*: Brazil, Russia, India, China, and South Africa.
- *Frontier markets*: Iceland, Estonia, Nigeria, Jordan, and Vietnam.

The main advantage to geographic segmentation is that investors with significant domestic market exposure can better understand how to diversify across international markets. One disadvantage to this approach is that investing in international equity markets may subject investors to currency risk. Another disadvantage is an overestimation of the diversification benefit. For example, a domestic investor from a developed market purchases stock in large companies in a foreign market to diversify. But the companies may have already diversified their business internationally and may even derive much of their income from the investor's country.

Economic Activity

This approach groups companies into sectors or industries by applying either a market-oriented or a production-oriented approach. A *market-oriented approach* segments companies by markets served, how products are used by consumers, and how cash flows are generated. A *production-oriented approach* segments companies by products manufactured and inputs required during the production process. Note that applying either approach may lead to slightly different classifications. For example, a market-oriented approach may classify a coal company in the energy sector, while a production-oriented approach may classify that same company in the basic materials sector.

The four primary classification structures for segmenting companies by economic activity are:

- Global Industry Classification Standard (GICS).
- Industrial Classification Benchmark (ICB).
- Thomson Reuters Business Classification (TRBC).
- Russell Global Sectors Classification (RGS).

The GICS applies a market-oriented approach, while the remaining structures apply a production-oriented approach. Each of these structures starts with a broad sector/industry classification and then divides further by subsector/sub-industry. As an example, consider the segmentation method shown in Figure 6.2 for the GICS Consumer Staples sector.

Figure 6.2: GICS Classification Example

Sector	Consumer Staples
Industry Group	Food, Beverage, and Tobacco
Industry	Beverages
Sub-Industry	Soft Drinks



PROFESSOR'S NOTE

The four classification structures differ on their application of sector versus industry. For example, GICS, TRBC, and RGS refer to their top level as sectors and then subdivide into industries. In contrast, ICB starts with industries and then subdivides into sectors.

An advantage to economic activity segmentation is that it allows portfolio managers to analyze, compare, and construct performance benchmarks based on specific sectors/industries. In addition, diversification benefits are enhanced when investments span different sectors/industries. The main disadvantage to this approach is that some companies, especially larger firms, may have business operations that are not easily assigned to one specific sector or industry.

Equity Indices and Benchmarks

Equity market indices and equity portfolio benchmarks can be constructed based on a combination of size/style and geographic segmentation. For example, the MSCI Europe Large Cap Value Index and the MSCI China Small Cap Index combine elements from both size/style and geographic classifications. Economic activity can also be used to subdivide equity indices by sector or industry. For example, the MSCI World Energy Index and the S&P Global Natural Resources Index track global companies categorized by sector/industry. Equity indices can also track unique client considerations, such as ESG practices.



MODULE QUIZ 6.1

1. Equities typically offer diversification benefits when combined with other major asset classes in a portfolio. **Discuss** two reasons an economic crisis may affect the risk

reduction achieved through diversification.

2. Assume an investor is segmenting the equity investment universe by economic activity. **Describe** *two* advantages for applying this segmentation approach.

MODULE 6.2: PORTFOLIO INCOME AND COSTS, SHAREHOLDER ENGAGEMENT, PASSIVE/ACTIVE MANAGEMENT



Video covering this content is available online.

LOS 6.c: Describe the types of income and costs associated with owning and managing an equity portfolio and their potential effects on portfolio performance.

There are several ways to earn (current) income from an equity portfolio.

Dividend income is the most obvious and often the largest. One additional consideration is how the dividends are taxed; they may be subject to income and/or withholding tax. Note that investors with a growth-oriented focus are less likely to seek portfolio income from dividends.

Some companies pay an **optional stock dividend**, which allows investors to choose between cash payments or stock dividends (i.e., new shares). This “option” between cash and stock dividends has value for the investor and can even be sold to another investor to immediately monetize the “option.” On occasion some companies pay a **special dividend**, a one-time cash payment to investors (as opposed to the more typical periodic regular dividend).

Securities lending is another way to generate current income. Securities lending is often part of short selling. A short sale is the sale of a security that is not owned. To make the short sale, the seller must typically borrow the security in order to deliver it to the buyer when the short sale is made. The lender of the security is typically paid a fee and may also receive collateral or cash on which they can also earn a return. The lender also receives back the security lent at a future date. Securities lending is not unusual in index funds, large institutional portfolios such as pension funds, and endowments.

Security or **stock lending** does introduce additional issues. Short selling (like any sale) tends to drive down the security’s price, which is not particularly beneficial to the lender (who still owns) the security. This is more likely to concern an active manager who expects their holdings to outperform, as opposed to a passive index fund manager. The lender must also be concerned with the quality of the borrower and the borrower’s ability to return the securities. The borrower must also compensate the lender for any dividend payments that occur during the period of the loan. The lender generally loses the right to vote the shares during the period of the loan.

Lenders typically collect a small fee, in the range of 0.2%–0.5% annually for developed markets. This fee can increase substantially for emerging market stock loans or stocks that are in high demand for borrowing, known as *specials*. As mentioned, lenders can also earn extra income by reinvesting the borrower’s posted cash collateral. However,

this reinvestment would be subject to various risks, such as market, credit, and operational risk. The reinvestment is likely to incur costs such as administration costs to keep track of everything.

Additional income strategies include:

- Writing options (i.e., selling options) to earn option premiums. A **covered call** strategy involves writing a call option on a stock owned. The writer then loses the upside of the security if the price increases above the strike price. Another option strategy is a **cash-covered put** (also known as a cash-secured put). This involves selling a put option on stock and setting aside sufficient cash equivalents to pay for the stock if the put option buyer exercises their right. The risk to the seller is the put buyer will only exercise the right if the stock declines in value.
- **Dividend capture** where an investor buys a stock right before its ex-dividend date, holds that stock through the ex-dividend date (entitling the investor to receive the dividend payment), and then sells the stock. The strategy is premised on and will be profitable if the stock price declines by less than the amount of the dividend. Theory says the stock should decline by the dividend amount but stock movements may differ from expectations given market forces (e.g., supply and demand) and/or income tax considerations.

Equity portfolios also incur fees and costs. These include:

- **Management and performance (incentive) fees.**
- **Administration** fees.
- **Marketing and distribution** fees.
- **Trading** costs.
- **Investment strategy** costs.

Management fees (i.e., ad valorem fees) compensate the manager and pay research and analysis, computer hardware and software, compliance, and processing trades. These fees are typically based on a percentage of assets under management and are due at regular time intervals (e.g., annually). The management fees vary and are usually higher for actively managed portfolios due to higher levels of investment analysis and portfolio turnover. The management fees are usually presented as a standard schedule of fees although they can be negotiated.

Some managers also earn **performance fees** (i.e., **incentive fees**) when the portfolio outperforms a stated return objective. These fees are more common for hedge funds and alternative managers. For example, suppose a portfolio exceeds a threshold return, the manager may earn a performance fee in the range of 10%–20% based on any capital appreciation above the threshold. Incentive fees are often one sided; the manager shares in outperformance but is not penalized for underperformance.

To protect an investor from paying for performance twice, there may be a **high-water mark**. For example, assume a hedge fund earns a performance fee for outperforming its return objective and then the portfolio declines in value. The manager will only earn an incentive fee on future appreciation above the previous level that was already compensated for.



PROFESSOR'S NOTE

We are about to briefly discuss various types of fees and costs associated with equity (and other) assets. Managers may charge one management fee that covers all of these. In other cases the manager may break out some or all of these and present them as separate fees. Other managers may not provide some of these services and a separate third party provides and charges for them. The bottom line is that services are not free and must be paid for. The way the bill is presented varies and investors need to consider all the costs in total.

Portfolios may be subject to **administration fees** associated with corporate activities, such as measuring risk/return and voting on company issues. The manager may include these services in the basic management fee; however, if these functions are conducted by external parties, administration fees will likely be separate from management fees. Additional administrative type fees include the following:

- *Custody fees*: charged for having a custodian hold assets independent of the portfolio manager.
- *Depository fees*: charged to assist custodians with segregating portfolio assets and for verifying portfolio compliance with investment limits, such as leverage and cash requirements.
- *Registration fees*: charged for registering ownership of mutual fund shares.

Some firms also charge separate **marketing** and **distribution** fees to cover:

- Employing marketing, sales, and client services teams.
- Advertising investment products and services.
- Sponsoring and presenting at relevant conferences.
- Developing and distributing marketing materials (e.g., brochures).
- Fees from online platforms that offer multiple fund options (i.e., platform fees).
- Sales commissions from financial intermediary services (e.g., financial planners or brokers).

Trading costs (i.e., transaction costs) refer to costs associated with buying and selling securities. These transaction costs can be either explicit or implicit. *Explicit costs* include broker commissions, stock exchange fees, and taxes. *Implicit costs* include bid-ask spreads, price impact from the transaction, and delay costs (i.e., slippage costs) from not completing an entire trade due to illiquidity.

Investment strategy costs are an implicit cost related to the chosen investment strategy. As mentioned earlier, actively managed funds that require more investment analysis and transactions will have higher fees/costs than passively managed funds. However passive funds like index funds may be subject to hidden costs from *predatory trading*. This additional cost stems from predatory traders purchasing (selling) shares that are soon to be added (removed) from an equity index. These transactions will create price impact costs for the fund and a profit for the predatory trader.

Strategies may demand or provide liquidity. For example, momentum strategies tend to demand liquidity by buying shares in an increasing market and selling shares in a

decreasing market. This is likely to create high market impact costs. Contrarian strategies are the opposite and tend to supply liquidity by buying shares in a decreasing market and selling shares in an increasing market. This is likely to create low market impact costs. Passive index replication strategies are likely to fall in the middle.

Shareholder Engagement

LOS 6.d: Describe the potential benefits of shareholder engagement and the role an equity manager might play in shareholder engagement.

Shareholder engagement refers to investors and managers interacting with companies in ways to potentially favorably impact the stock price. Engagement also benefits the company with improved corporate governance. Engagement includes participating in calls with the company and/or voting on corporate issues at general meetings (i.e., general assemblies). Such meetings may discuss:

- *Corporate strategy*: Company objectives, constraints, growth opportunities, and resources. Additional items may include company research, culture, products, competitive environment, and sustainability. Prioritizing stakeholder interests and balancing short-term obligations with long-term goals may also be items of interest for shareholders.
- *Capital allocation*: Selection process for new projects that add value, and strategy for potential mergers and acquisitions. Shareholders may also be interested in capital expenditures, use of leverage, payment of dividends, and equity financing.
- *Corporate governance*: Internal controls and functions of the company's audit and risk committees. Additional items include how the company manages regulatory and political risks.
- *Compensation structures*: Top management remuneration, incentives, and alignment with shareholder interests. Larger shareholders may influence future compensation structures.
- *Composition of the board of directors*: The board's experience, competence, diversity, culture, and effectiveness. Additional items include succession planning to address departing board members.

Shareholder engagement is not free because it requires an investment of time and resources.

- Active managers are more likely to do so in order to influence the company in ways they expect will improve performance.
- Passive managers are more likely to focus on minimizing these costs for themselves and for the companies they invest in.
- Larger investors can more easily absorb these costs as they spread the costs over a large amount of assets.
- Successful engagement benefits all shareholders, including "free riders." Free riders do not engage but reap the same benefit from any increase in the stock price.

- Engagement can also be used to address nonfinancial concerns (e.g., ESG issues), though such benefits may be harder to quantify.
- Other stakeholders such as employees, customers, creditors, regulators, and governments are also impacted by shareholder engagement outcomes. After engagement activities, these stakeholders may have more or less influence on a given company. For example, decisions to reduce company costs may impact employee compensation. The act of shareholder engagement can also be influenced by external factors, such as academic research or media coverage.

Beyond the issues of time, cost, and free riders; shareholder engagement has other limitations. Engagement may:

- Focus on short-term goals such as increasing cash flows or stock prices at the expense of the company's long-term goals.
- Lead to the acquisition of material, nonpublic information; increasing the risk of insider trading.
- Create potential conflicts of interest. For instance, an engaged portfolio manager may support company management because the management also invests in the manager's fund.

Equity managers play a key role in engagement and may assign specific employees responsibility for this task. Firms may also consult with outside experts for advice on shareholder voting and monitoring corporate governance issues. Some countries set legal and regulatory requirements and require firms to establish written documentation for how to meet these obligations.

Activist investing takes engagement even further. Activist investors may:

- Propose shareholder resolutions and launch media campaigns to influence the vote.
- Seek representation on the company's board of directors.
- Launch proxy fights to achieve their goals. A proxy fight means seeking to persuade other shareholders to support their proposals.

Active/Passive Management for Equity Portfolios

LOS 6.e: Describe rationales for equity investment across the active management spectrum.

Passive investors seek to replicate an equity market index or benchmark. Active managers seek to outperform the benchmark and add value. While the distinction seems clear, the reality is strategies may blur this distinction, such as closely track the index with limited deviations allowed to add some value. Active investing is riskier as the manager could also underperform the benchmark. Rationales for shifting to active management include:

- Confidence the manager has the expert knowledge and skill to add value.
- Client preferences—unless enough investors are interested, the manager will not be able to attract enough funds to cover the costs of active investing. Growth strategies

are often seen as more likely to benefit from active management while value style may be more passive.

- Managers must also manage the investor's expectations for what to reasonably expect from the strategy; investors with unreasonable expectations are more likely to become dissatisfied.
 - However, strategies that become too popular can also be a problem. Too much capital flowing in may make it harder to find opportunities to add value.
 - Managers must also select an appropriate benchmark that investors will be interested in. The benchmark should contain a broad range of underlying equities with sufficient liquidity to support active management. Narrow limited benchmarks don't give the manager much room to deviate and are likely to support a more passive approach.
- Mandates from clients to invest in certain companies (e.g., ESG considerations) may require a more active approach as the manager may need to use screening and other techniques to meet the mandates.

The results of active management are less certain and the costs are higher. Active management is also subject to other potential risks:

- *Reputation risk* results from violations of rules, regulations, client agreements, or moral principles.
- *Key person risk* results from individuals who are essential to the success of the fund leaving the investment firm.
- *Higher portfolio turnover* which can lead to higher tax burdens. Active funds could be structured to limit tax consequences, but the techniques used to do this can themselves be costly and risky. Managers who use such techniques need additional knowledge to navigate the applicable tax regulations, which of course vary by country and situation.



MODULE QUIZ 6.2

1. **Explain** why actively managed portfolios are typically subject to higher fees and costs than passively managed portfolios.
2. **Explain** how shareholder engagement can benefit investors who are not actively involved in company issues.
3. **Identify** two disadvantages of shareholder engagement activities.
4. A client is concerned with low fees, seeks substantial value added versus their benchmark, has numerous ESG restrictions, and has selected a narrowly defined benchmark made up of large companies. Based on the client's concerns, **explain** *two* reasons the client should favor a passive approach and *two* reasons the client should favor an active approach.
5. Compared to passively managed funds, active funds tend to have higher research and trading costs. **Identify** and **describe** *two* additional types of risk for active

MODULE 6.3: BENCHMARK SELECTION



Video covering this content is available online.

LOS 6.f: Discuss considerations in choosing a benchmark for an equity portfolio.

An equity index used as a benchmark for equity investment strategies must be (1) rules-based, (2) transparent, and (3) investable.

Rules-based: The rules for including and excluding stocks in the portfolio, the weighting scheme, and the rebalancing frequency must be consistent, objective, and predictable so investors can replicate the investment performance of the index.

Transparent: The rules underlying the index are public, clearly stated, and understandable to investors.

Investable: Investors can replicate the return and risk performance of the index.

Considerations when choosing a benchmark include (1) determining the desired market and risk exposures, and (2) identifying the methods used in constructing and maintaining the benchmark index.

Market and Risk Exposures

The choice of portfolio exposure includes the choice of which markets to invest in as well as the various risks the portfolio will be exposed to. Overall, these choices are determined by the investor's risk and return objectives and portfolio constraints identified in the investment policy statement.

Some examples of **market exposure** choices are:

- Choosing between broad market exposure and focused exposure to certain sectors.
- Choosing between domestic or international exposure.
- Choosing among developed, emerging, or frontier markets.

The **risk factor exposure** of an equity portfolio refers to the expected sensitivity of portfolio returns to various risk factors. Examples of risk factors used in portfolio construction include market risk (beta), firm size, style (e.g., growth vs. value), and prior returns (momentum). Other factors considered include the liquidity, volatility, and firm "quality." We examine portfolio risk factors in greater detail later in this review.

Identifying the Methods Used in Constructing and Maintaining an Index

The construction of an index starts with the method of identifying stocks for inclusion; this method can be **exhaustive** (every stock in a defined universe; e.g., the CRSP U.S. Total Market Index) or **selective** (a subset of stocks within a universe; e.g., the S&P 500 Index or the Dow Jones Industrial Average [DJIA]).

Methods of index-weighting include: (1) market-cap weighting, (2) price weighting, (3) equal weighting, and (4) fundamental weighting.

Market-cap weighting refers to weighting each portfolio stock by its total market capitalization as a percentage of the total capitalization of all the stocks in the index. The market portfolio in the CAPM and many indexes, such as the S&P 500 Index, are market-cap weighted. The most common market-cap weighting method in practice is based on each stock's free-floating shares (i.e., outstanding shares that are not closely held and, therefore, available for trading by market participants).

Price weighting refers to weighting each portfolio stock by its price. This can be achieved with a portfolio that holds an equal number of shares of each index stock, which gives stocks with higher share prices larger index weights. The DJIA is an example of a price-weighted index.

Equal weighting refers to investing equal amounts in each portfolio stock. Equal weighting reduces concentration risk, especially compared to market-cap weighting for the large-cap segment where capitalizations vary widely. For example, the weight of the five largest firms in the S&P 500 Index in 2018 was greater than the weight of the 250 smallest firms in the index. Equal weighting also reduces changes in sector exposures as market prices change compared to market-cap weighting. Equal weighting is factor-indifferent; it randomizes factor mispricing and, because of its small-cap bias relative to market-cap weighting, returns are more volatile than for market-cap weighting. Equal weighting can produce marginally better returns before transaction costs when stock prices vary around their intrinsic values.

Fundamental weighting refers to weighting index stocks by their proportions of the total index value of a fundamental factor, such as sales, income, or dividends. For example, a stock of a firm that pays 3% of all the dividends paid by index companies will have a 3% weight in a dividend-weighted index.

Stock concentration is a key concern in the selection of the appropriate index. Concentration can be captured using the concept of "effective number of stocks," which can be measured using the **Herfindahl-Hirschman index (HHI)**. HHI is the sum of the squared weights of the individual stocks in the portfolio:

$$HHI = \sum_{i=1}^n w_i^2$$

where:

n = number of stocks in the portfolio

w_i = weight of stock i

HHI ranges from $\frac{1}{n}$ (an equally weighted portfolio) to 1 (a single stock portfolio), so as HHI increases, concentration risk increases.

The *effective number* of stocks is the reciprocal of the HHI:

$$\text{effective number of stocks} = \frac{1}{HHI}$$

For example, a market-cap weighted index with 500 stocks might have an HHI of 0.01 and, therefore, an effective number of stocks of $\frac{1}{0.01} = 100$. The fact that 100 is less than

the number of stocks in the portfolio reflects the disproportionate effect of the largest capitalization stocks in the index. An *equal weighted* index of 500 stocks would have an HHI of 0.002 and an effective number of stocks of $\frac{1}{0.002} = 500$.

Rebalancing is the process of adjusting portfolio weights as index weightings change. For an equal weighted index, portfolio weights are no longer equal as soon as prices change. Price-weighted index weights change in response to stock splits and stock dividends. Market-cap-weighted portfolio weights require rebalancing when index firms issue new shares or repurchase shares in a significant amount. Rebalancing incurs trading costs (and possibly tax costs) and will decrease returns. To reduce such costs, rebalancing is often done only periodically, often quarterly.

Reconstitution is the process of removing and replacing stocks that no longer fit the desired market exposure of an index. For example, if a small-cap stock's capitalization increases, it may become a mid-cap stock and have to be removed from and possibly replaced in a small-cap index. Reconstitution will also reduce index portfolio returns as trading costs are incurred.

Two practices are used to reduce trading costs associated with migration of a stock between indexes on reconstitution dates. **Buffering** refers to the practice of establishing a threshold level for the change in a firm's capitalization rank that must be met before moving it from one index to another on a reconstitution date. Consider a large-cap index comprising the stocks of the 200 largest firms in a market and a mid-cap index of the next 300 stocks in capitalization rank. If a firm in the mid-cap index increases in capitalization so that it is one of the largest 200 firms, it is not actually moved into the large-cap index until its rank increases beyond the *buffer zone*—for example, until it has reached the size rank of 150 or higher at the next reconstitution date.

An alternative method of reducing the transaction costs of stock migration among indexes is termed **packetting**. With packetting, when a mid-cap company's capitalization increases so that it qualifies as large-cap stock, half of the portfolio position is moved to the large-cap index on the reconstitution date. If the stock still meets the criteria for inclusion in the large-cap index at the next reconstitution date, the remainder of the position is moved from the mid-cap to the large-cap index.



MODULE QUIZ 6.3

1. Which of the following is a necessary characteristic for an equity index to have in order to use it as a benchmark for an equity portfolio?
 - A. Selective.
 - B. Investable.
 - C. Flexible.

KEY CONCEPTS

LOS 6.a

The roles of equities in a portfolio include capital appreciation, dividend income, diversification benefits, and the potential to hedge inflation.

The allocation to equity must be consistent with the client's investment objectives and constraints. For investors with environmental, social, and governance (ESG) considerations, portfolio managers may apply negative or positive screening approaches to select appropriate companies or use thematic or impact investing techniques.

LOS 6.b

The equity investment universe can be segmented by:

- Size (market capitalization) and style (growth, value, or blended).
- Geographic segmentation (which includes developed markets, emerging markets, and frontier markets).
- Economic activity segmentation by sectors or industries. Classification can be based on a market-oriented or a production-oriented approach.
- Or combinations of the previous can be used.

LOS 6.c

Income can be generated from:

- Dividends, mostly in the form of regular dividends received.
- Lending securities for a fee and earning funds on cash collateral received.
- Writing options for the premium received.
- Dividend capture through buying a stock just before and selling it just after it goes ex-dividend.

Managers typically charge regular and some charge performance-based management fees. Some managers cover all services in the management fee. Others also charge additional fees for specific additional services, or coordinate with third-party providers who provide and charge fees for specific services. The bottom line is to determine the total fees regardless of how they are broken down.

Other costs to consider are:

- Transaction and trading costs, which may be explicit or implicit.
- Strategy costs—generally active strategies will have higher cost. Passive strategies may incur hidden costs such as predatory pricing when others anticipate and trade ahead of the passive investor.
- Liquidity demands—momentum strategies that buy in up or sell in down markets demand liquidity and typically pay high market impact costs. Contrarian strategies are the opposite.

LOS 6.d

Shareholder engagement refers to shareholders and managers seeking to influence the companies they invest in through calls and/or shareholder voting. Engagement benefits the company with improved corporate governance and may also benefit shareholders through higher stock price. Free riders who do not incur the costs of engagement also benefit.

Activist investors take this further and propose resolutions to be voted on and seek the support of others or engage in proxy fights to achieve their goals.

LOS 6.e

Equity portfolios are often characterized as being actively or passively managed. However, in practice, portfolios may exhibit characteristics from both investment strategies. Rationales for equity portfolios to span across the passive–active spectrum include manager confidence, client preferences, benchmark selection, client mandates, active management costs/risks, and taxes.

LOS 6.f

An equity index as a benchmark for equity investment strategies must be (1) rules-based, (2) transparent, and (3) investable.

Considerations in choosing a benchmark include (1) determine the desired market exposures, (2) be consistent with the client's objectives and constraints, and (3) identify the method used for constructing the index.

Constructing and maintaining an index involves the following:

- The weighting method to construct the index: (1) market-cap weighting, (2) price weighting, (3) equal weighting, or (4) fundamental weighting.
- Considering the level of stock concentration. The effective number of stocks can be determined as the reciprocal of the Herfindahl-Hirschman index (HHI).

$$HHI = \sum_{i=1}^n w_i^2$$

$$\text{effective number of stocks} = \frac{1}{HHI}$$

- The frequency of rebalancing (updating the weights of the stocks in the index) and reconstitution (removing and replacing stocks that no longer fit the index market exposure).

ANSWER KEY FOR MODULE QUIZZES

Module Quiz 6.1

1. Risk reduction is likely to be less than expected.
 - The correlations are likely to move upward towards 1.0.
 - The volatility of the assets is likely to increase.
 (LOS 6.a)
2.
 - It allows portfolio managers to analyze, compare, and construct performance benchmarks based on specific sectors or industries.
 - Diversification benefits are enhanced when investing across sectors or industries.
 (LOS 6.b)

Module Quiz 6.2

1. Such funds require more investment analysis and portfolio turnover than passively managed funds. (LOS 6.c)
2. They can earn a free ride, benefiting from the activities of others to increase the stock price without the time and cost of engagement. (LOS 6.d)
3. (1) The cost and time commitment from shareholders and management, (2) the desire to influence cash flows or stock prices in the short term, at the expense of long-term goals, (3) the potential for insider trading violations, and (4) the potential for conflicts of interest. (LOS 6.d)
4. Passive: (1) Passive managers can charge lower fees; (2) The narrowly *defined* benchmark of presumably efficient large cap stocks is not going to provide the opportunity for active managers to find ways to add value.
Active: (1) Active management is required to meet the desired value added; (2) The ESG restrictions will require an active manager who uses various screening and other techniques to simultaneously meet this constraint *and* the overall objectives. This client sounds highly unrealistic in their objectives, but that was not the question asked. (LOS 6.e)
5.
 - Reputation risk results from violations to rules, regulations, client agreements, or moral principles.
 - Key person risk results from essential individuals leaving the investment firm.(LOS 6.e)

Module Quiz 6.3

1. **B** An equity index that is suitable as a benchmark should be rules-based, transparent, and investable. (LOS 6.f)

READING 7

OVERVIEW OF FIXED-INCOME PORTFOLIO MANAGEMENT

EXAM FOCUS

This reading expects candidates to understand the different roles of fixed-income securities in portfolios and the two types of fixed-income mandates (liability-based mandates and total return mandates), along with bond market liquidity. In addition, candidates must take the time to understand and practice the model for projecting or decomposing a bond's return. This reading also discusses liability-driven investing (LDI) and how to develop a fixed-income portfolio based on an investor's balance sheet. Lastly, candidates must understand the risks and techniques associated with LDI.

MODULE 7.1: ROLE OF FIXED INCOME



Video covering this content is available online.

LOS 7.a: Discuss roles of fixed-income securities in portfolios and how fixed-income mandates may be classified.

The fixed-income market is highly varied; it includes publicly traded securities such as bond and money market securities, as well as nonpublic instruments such as loans and private placement securities. The market also varies by maturity and credit quality segments. There are structure differences such as straight bonds without embedded options, instruments with embedded prepayment options, variable coupon structures, and inflation adjustment features.

As an asset class used in a portfolio, fixed income may provide:

1. *Diversification.* In general, fixed income has low correlation to equity markets. Adding an asset class to an existing portfolio with a correlation of less than +1 improves its risk-adjusted return through diversification benefits. The lower the correlation, the greater the diversification benefit. Specific correlation numbers vary by time period and type of instrument used. For 2000 to 2019, the correlations of various fixed-income indexes to the S&P 500 equity index ranged from -0.30 for 10-year U.S. Treasury bonds to +0.63 for U.S. high-yield (credit-risky) bonds.

Diversification can be achieved internally within the fixed-income asset class, primarily due to changes in credit spreads causing divergence in the performance of investment-grade securities versus credit-risky high-yield (below investment-grade) securities.

These correlations are not always stable over time. A particular problem is flight to quality. During periods of market stress, all lower-quality and riskier assets, including high-yield bonds and equities, tend to decline together (correlation approaching +1) as investors sell these assets and buy high-quality developed-market government bonds for safety. Thus, correlation of these government bonds to riskier assets declines during periods of stress and may be negative.

The volatility of bond market returns can also vary over time, increasing significantly for high-yield bonds in times of market crisis.

2. *Regular cash flow.* Most fixed income provides regular, predictable cash flow that investors can use to meet expected future obligations. This is convenient for an individual needing regular living expenses or specific periodic expenditures such as college tuition payments. Institutions such as insurance companies that must make periodic payments to policyholders could structure and dedicate a portfolio of bond assets to meet these payouts. Investors could also build a buy-and-hold ladder portfolio of bonds to provide regular cash flow. Buy and hold means no sales or trading are planned, and ladder means a somewhat equal amount of par comes due periodically. Implicit in this discussion is that there is no significant credit risk and that all payments will be made on the bonds.
3. *Inflation hedge.* While not the first thing most investors would think of, some types of bonds do provide forms of inflation protection. Standard fixed-coupon (nominal rate) bonds do not. For simplicity, assume the bonds are purchased at par so that initial yield is the coupon rate. The purchase yield and coupon reflect nominal compensation for an expected future rate of inflation and a real return above that rate of inflation. If inflation increases, the coupon cash flow is fixed and the investor suffers on an inflation-adjusted basis. Looked at another way, the yield a new investor would want increases and the price of the bond must decline.
 - Inflation-linked (also called real rate or real return) bonds provide direct protection for the effect of inflation. Like regular bonds, the coupon payment amount is the coupon rate $\times$ par. But unlike regular bonds, the par adjusts for inflation. If 1 million par is purchased and inflation is 5%, the par increases by 5% to 1.05 million. (For later comparison with floating-coupon bonds, assume the previous inflation rate was 3%, though this does not directly affect the calculations for the inflation-linked bond.) That leads the coupon payment amount to increase by 5% as well. For example, if the real rate were 0.5%, the first (annualized) coupon payment is 5,250 $(1,050,000 \times 0.005)$. This adjustment continues every period to compensate for cumulative inflation over the life of the bond. At expiration, inflation-adjusted par is paid to the investor. Thus, both coupon payments and par are inflation protected.
 - Floating-coupon (floating-rate) securities also provide inflation protection. The coupon rate is set by a formula such as the market reference rate (MRR) + 100 basis points. If inflation and MRR are initially 3.0% and 3.5%, the first (annual) coupon payment on 1 million par would be 45,000 $[1,000,000 (0.035 + 0.01)]$. If inflation then increases by 2% to 5.0%, it is likely MRR will also increase by 2% to 5.5% and the next coupon payment will increase to 65,000 $[1,000,000 (0.055 +$

0.01]]. No adjustment is made to the par amount. Thus, it is said the coupons are inflation protected but not the principal.



PROFESSOR'S NOTE

For some candidates, misunderstanding this information is easy. In theory, both inflation-linked and floating-coupon securities provide full inflation protection but do so in different ways. Imagine fixed-coupon nominal rate (NR), inflation-linked, and floating-coupon bonds from the same issuer with the same maturity. In a fully efficient market, all three would be priced to reflect the same consensus expectations for inflation and have the same expected return. (Because they respond to inflation risk differently, there could be small differences.) If the actual rates of inflation turn out to higher (lower) than initial consensus expectations, the actual returns for the inflation linked and floating coupon would be superior (inferior) to the NR bond. Between the inflation linked and floating coupon, one or the other may end up being best depending on the actual path of future inflation. Notice in the earlier example with inflation increasing from 3% to 5% the par and coupon payment amount for the inflation-linked bond increased by 5% while the par of the floating coupon was unchanged, but the coupon payment amount went from 45,000 to 65,000, an increase of 44.4%.

The bottom line is to accept the conclusions as presented in the reading; they are correct.

Fixed-Income Mandates

Fixed-income investment mandates can be classified into two major types: liability-based mandates and total return mandates.

Liability-based mandates are portfolio assets that are managed solely to meet expected future liability payouts. All asset cash flows are reinvested until paid out to meet the liabilities. This is often referred to as immunization. There are several forms and variations of **immunization**.

- **Cash-flow matching** is the simplest form of immunization. The assets are selected so that cash flows occur when and in the size needed to meet the liability payouts.
- **Duration matching** matches the duration of the assets and liabilities so the two will fluctuate in a similar way as interest rates change, such that their ending values will remain matched.
- **Contingent immunization (CI)** is a hybrid of active management and immunization. The portfolio is initially funded with more money than required to meet the future liability payouts. The present value of the assets (PVA) exceeds the present value of the liabilities (PVL). The difference is the surplus. As long as the surplus is positive, the portfolio can be managed in any way the manager believes will add value. If CI succeeds, the surplus will grow and the ultimate cost of CI will be less than that of initially immunizing. If the active management is unsuccessful and the surplus declines to zero, the portfolio must be immediately immunized and the ultimate cost of CI will be more than that of initial immunization but by a known amount.

- **Derivatives overlays**, involving the use of futures or swaps contracts, can be used to implement duration matching or contingent immunization strategies.

Total return mandates do not seek to fund future liabilities but may target an absolute rate of return or, more commonly, seek to equal or outperform (relative return versus) a benchmark. The key metrics to evaluate such portfolios are **active return** (portfolio return less return of the relevant benchmark, also called value added or alpha) and volatility of that active return (standard deviation of active return, also called **active risk**, **tracking error**, or **tracking risk**). Total return mandates include the following:

- **Pure indexing**, which attempts to replicate the performance of a bond index. It targets zero active return and risk. Unlike the equity market, the large number of individual bonds in most indexes and their potential lack of liquidity makes literal duplication of the index (holding every issue in the same weight as in the index) impractical. Most pure bond indexing instead seeks to exactly match all the risk factors of the index (such as duration, credit or quality, sectors, and prepayment risks) while still allowing the manager some leeway on the individual bonds selected. The turnover (trading) in the portfolio should be low and similar to the turnover in the index.
- **Enhanced indexing** allows some additional flexibility in constructing the portfolio and seeks to add some modest active return. Typically, duration (interest rate risk) is still matched to the index, but some risk mismatches such as modest over- or underweighting of sectors and quality are allowed. Slightly higher portfolio turnover is likely.
- **Active management** allows much larger deviations from the risk factors of the index and seeks greater active return. Duration can also be mismatched and portfolio turnover can be much higher.

Fixed-Income Portfolio Measures

LOS 7.b: Describe fixed-income portfolio measures of risk and return as well as correlation characteristics.



PROFESSOR'S NOTE

This section reviews some fundamental definitions of fixed-income risk and return measures, almost all of which have been met at previous levels of the CFA program. Remember the Level III exam will likely be less focused on the calculation of these measures than previous levels were and more focused on the interpretation and use of these measures in a portfolio management situation. Understanding what the measures are telling you is the key focus in this section.

Key bond risk and return measures are displayed here:

Name	Definition	Interpretation
Macaulay duration	Weighted average <i>time</i> to receive cash flows, where weights are the present value of the cash flows	A higher Macaulay duration means investors are waiting longer to receive cash flows and hence face higher price volatility when yields change.
Modified duration	Macaulay duration divided by one plus the periodic yield of the bond	This gives the approximate expected percentage change in bond price for a 1% change in yield. For example, a bond with a modified duration of 7 is expected to fall by approximately 7% when yields rise by 1%.
Effective duration	Sensitivity of a bond's price to a parallel shift change in a benchmark yield curve, based on directly modeling changes in prices due to changes in a benchmark curve	This gives the approximate expected percentage change in bond price for a 1% change in benchmark curve. Effective duration is used for complex bonds where cash flows are not certain, such as bonds with embedded options.
Key rate duration (or partial duration)	Sensitivity of a bond's price to a change in a benchmark yield curve for a specific maturity, while other rates remain the same	It helps to assess exposure to nonparallel changes in yield curves, where different maturity rates move by different amounts. For example, a bond with a 10-year key rate duration of 7 is expected to fall by approximately 7% when 10-year benchmark yields rise by 1% while all other maturity rates stay the same.
Empirical duration	A measure of interest rate sensitivity derived from regressing bond returns versus benchmark yield changes	This is the same interpretation as effective duration; however, it is based on past observed market behavior rather than derived through modeling.
Money duration (or dollar duration)	A measure of the monetary gain or loss expected due to a 1% change in yield, which is calculated as modified duration $\times$ market value	A higher money duration implies a larger absolute change in portfolio value (in currency terms) when yields change by 1%.
Price value of a basis point (PVBP) [or "dollar value of an 0.01" (DV01) or basis point value (BPV)]	Money duration $\times$ 0.0001	It measures the absolute change in portfolio value (in currency terms) when yields change by 1 basis point.
Convexity	The extent to which the bond's price behavior versus changes in yield is nonlinear (i.e., not a straight line). Convexity is positive for fixed-coupon bonds without embedded options.	Positive convexity implies that a bond price is expected to rise by <i>more</i> than that implied by duration alone when yields fall and fall by <i>less</i> than that implied by duration alone when yields rise.
Effective convexity	Measures the extent of a <i>nonlinear</i> relationship between a bond's price and changes in a benchmark yield curve, based on directly modeling changes in prices due to changes in a benchmark curve	Effective convexity is used for complex bonds where cash flows are not certain, such as bonds with embedded options.

Some key facts to consider include the following:

- Convexity is valuable to bondholders when yields are expected to change. This is because positive convexity, as just described, implies that a bond price is expected to rise by *more* than that implied by duration alone when yields fall and fall by *less* than that implied by duration alone when yields rise. Note that this will mean investors will pay higher prices for higher convexity bonds (and accept lower yields vs. yields of other less convex bonds).
- Convexity is often referred to as a second order measure—meaning that it measures how much the sensitivity of price versus yield *changes* as yields change. As a second order measure, it is approximately proportional to duration squared—in other words, a bond with a duration of 20 years will have approximately four times the convexity of a bond with a duration of 10 years (because 20 squared is four times 10 squared).
- Convexity is directly related to the *dispersion* of cash flows in time around the Macaulay duration of the bond. For a given Macaulay duration, the lowest convexity bond will be a zero-coupon bond with one cash flow at maturity.

Fixed-Income Portfolio Measures

When combining bonds together in a portfolio, the following apply:

- The Macaulay duration of a portfolio is the weighted average time to receive the cash flows of the portfolio. It is commonly estimated as the cash-weighted duration of the individual assets in the portfolio (note that this applies to all basic duration measures). For example, if 40% of a portfolio is invested in a bond with a duration of 10 and the remaining 60% of the portfolio is invested in a bond with a duration of 15, the portfolio duration is estimated as $(0.4 \times 10) + (0.6 \times 15) = 13$.
- The modified duration and convexity of a portfolio is estimated as the cash-weighted convexity of the individual assets in the portfolio, similar to the process for the Macaulay duration just described.
- The effective duration and effective convexity of a portfolio are calculated using the following formulas:

$$\text{effective duration} = \frac{(PV_-) - (PV_+)}{2(\Delta\text{curve})(PV_0)}$$

$$\text{effective convexity} = \frac{(PV_-) + (PV_+) - 2(PV_0)}{(\Delta\text{curve})^2(PV_0)}$$

where:

PV_0 = current value of the portfolio

PV_- = value of portfolio when benchmark curve is shifted down

PV_+ = value of portfolio when benchmark curve is shifted up

Δcurve = change in benchmark curve

- **Spread duration** measures a portfolio's percentage sensitivity to a 1% change in *credit spreads*.
- **Duration times spread (DTS)** is equal to spread duration multiplied by the bonds' credit spread. This measure adjusts spread duration to give a higher sensitivity to spread changes when spreads themselves are higher. This adjustment reflects the empirically observed behavior that bonds with higher spreads are expected to have higher spread *changes* (i.e., spread changes tend to be proportional to current spread levels, rather than the same in absolute term across bonds with different spreads).

Fixed-income managers would use these measures just listed to actively manage a fixed-income portfolio as follows:

- A manager expecting interest rates to fall would increase the duration of their portfolio in order to increase the amount by which their bond prices rise. Conversely, a manager who expected rates to rise would lower the duration of their portfolio.
- A manager who expects credit spreads to narrow would increase the spread duration of their portfolio in order to increase the amount by which their bond price rises. They may also lower the credit rating of the bonds held in the portfolio. Conversely, a manager who expects spreads to widen would decrease the duration of their portfolio or increase the average credit rating of their holdings.
- A manager can use **relative value** techniques to rank individual bonds based on valuation, issuer characteristics, and technical market conditions, so that they can select the best bond to reflect their market view. For example, a manager who expects spreads to narrow can use relative value techniques to select the best bonds (according to their selection criteria) with a DTS greater than that of the benchmark.

Correlations Between Fixed-Income Sectors

Correlations between bonds in the same market are likely to be high due to the similar overarching macroeconomic conditions that apply to all bonds in the market.

Returns on investment-grade bonds with low credit risk are likely to be primarily driven by changes in the benchmark sovereign yield curve. High-yield bonds, however, are more likely to be affected by changes in spread than benchmark rates. There is likely a negative relationship between benchmark rates and spreads, because in poor economic conditions, interest rates will likely be low but credit spreads high (and vice versa). For this reason, high-yield securities are likely to exhibit higher correlations with equity.

Bond Liquidity

LOS 7.c: Describe bond market liquidity, including the differences among market sub-sectors, and discuss the effect of liquidity on fixed-income portfolio management.

Liquidity is the ability to make transactions in relatively large size, quickly, and with minimal deviation from the market price of the asset. In the bond market, the most

recently issued (on-the-run) developed-market government bonds are likely to be quite liquid and other bonds may be quite illiquid. Those other bonds may trade virtually never or at very wide bid-ask spreads. Issues leading to illiquidity include:

- The very large number of bond issues, each of which can be quite small, compared to the smaller number of stock issues in the equity market. A single issuer can have dozens or more separate bonds outstanding. Each can be unique in terms of maturity, coupon, and call features. Each issuer's bonds are heterogeneous (different), unlike the stock of the issuer, which is homogeneous. Most issuers have one class of common stock (and perhaps none, one, or a few issues of preferred stock).
- Bonds usually trade over the counter, which increases the search cost to find a counterparty to any transaction. This also makes transactions less transparent (it is harder to find information on past price and volume of transactions). Bond liquidity is usually higher for recently issued bonds as dealers may have an inventory of those bonds on hand. As time passes, the bonds are likely to become held in portfolios of investors with no plans to trade the bonds. When the issuer puts out a new issue of similar remaining maturity to a previous issue, the older issue becomes off-the-run and its liquidity decreases. The less liquid issues normally trade at a higher yield to maturity, offering a liquidity premium. These liquidity premiums can vary widely depending on specific circumstances.



PROFESSOR'S NOTE

Some authors refer to an illiquidity premium and others to a liquidity premium. They mean the same thing. The current Level III fixed-income readings call it a liquidity premium, meaning extra compensation in the form of higher yield for lack of liquidity. Remember that as liquidity and the ability to execute transactions at reasonable prices decrease, the liquidity (or illiquidity) premium and yield increase.

Liquidity varies widely by bond market subsector. Generally:

- Liquidity for on-the-run high-quality sovereign government debt is high and declines somewhat for older off-the-run issues. These sovereign government bonds are usually large in size, more homogeneous, and often used as benchmarks for pricing other bonds and as collateral in the repo market (an issue discussed later).
- Corporate bonds are far more varied in credit quality and size of issue. Liquidity typically declines with lower quality as the bonds become riskier and with smaller size of the issue. Size can be an important factor as it takes roughly the same commitment of resources to analyze a large or small issuer, but with smaller issuers it is more difficult to acquire a large holding for the portfolio. Small issuers may also be excluded from bond indexes.

Effects of Liquidity on Bond Portfolio Management

- *Pricing data.* Historically bonds trade over the counter with past price and value information not reported. This makes it difficult to find pricing information. Some countries have moved towards centralized collection and reporting of this trade information, increasing market transparency. In the absence of such reporting or with infrequent trading of a bond issue, pricing information may be based on out-of-

date trade prices. Instead of using old prices, bond pricing is often based on **matrix pricing**. Information is gathered on recent trades of bonds with similar features (maturity, quality, and coupon). The YTM of those trades is used to calculate the inferred market price of similar bonds.

- *Portfolio construction.* Buy-and-hold investors have less need for liquidity as they have no plans to sell the bonds; thus, they may prefer to select less liquid bonds in exchange for higher yield. In contrast, active investors and traders will prefer more liquid bonds, reasoning their active management strategies will generate additional return and compensate for lower initial yield. Other investors who anticipate the possibility of needing to sell bonds before maturity to meet unexpected needs may tend to avoid less liquid bonds such as longer maturity and smaller issuers or private placements. The cost of crossing a bid-ask yield spread can be approximated as $\text{bond duration} \times (\text{ask yield} - \text{bid yield})$. For example, a manager trading in a bond with a duration of 10 and a bid-ask spread of 20 bps would suffer costs of $10 \times 0.002 = 0.02$, or 2%, if they bought the bond at the ask and immediately sold the bond at the bid.
- The fact that most bond trading is done in dealer markets leads less liquid bonds to trade at higher bid-ask spreads. Dealers will reason that if they purchase such bonds, it will take longer to then resell them. Thus, dealers will widen the bid-ask to earn greater expected compensation for holding less liquid bonds in inventory.

Alternatives to Direct Investment in Bonds

- Fixed-income exchange-traded funds (ETFs) replicate many sectors of the fixed-income market. The shares are listed on an exchange and therefore easily traded throughout the trading day and have high liquidity.
- Open-end mutual funds offer the ability to subscribe to and redeem fund units on a daily basis and provide diversification and economies of scale that smaller investors would not be able to achieve directly in bond markets.
- Derivatives include exchange-traded bond futures and options and OTC instruments such as interest rate swaps and total return swaps (TRS). Under a TRS, one party (the *total return receiver*) pays an interest rate plus a spread in return for the total return on a reference bond portfolio. An investor might prefer to receive the total return of a bond portfolio under a TRS because the contract will likely only require a relatively small amount of capital to be posted as collateral versus fully funding an ETF position. Drawbacks of using a TRS to access bond market returns include facing the counterparty risk of the total return payer, the rollover risk of renewing contracts when reaching maturity, and potential regulatory reform requiring higher collateral and increasing the costs of such contracts.



MODULE QUIZ 7.1

1. A credit analyst is evaluating the potential for fixed-income securities to provide an inflation hedge. Which of the following types of securities protects both the bond coupon and notional principal amounts from inflation?
 - A. Fixed-coupon bonds.
 - B. Inflation-linked bonds.

- C. Floating-coupon bonds.
2. A fixed-income portfolio manager is seeking to outperform the Barclays Capital Aggregate Bond Index. Which of the following statements *most accurately* describes a pure indexing strategy for achieving the total-return mandate? Pure bond indexing:
- A. allows large deviations from the risk factors of the index and seeks a high active return.
 - B. matches duration to the index, but some risk mismatches of sectors and quality are allowed.
 - C. seeks to exactly match all the risk factors of the index while allowing the manager some leeway on the individual bonds selected.
3. Regarding the varying liquidity characteristics among bond market subsectors, which of the following bond issues would typically lead to higher levels of liquidity?
- A. Issuing a small corporate bond issue.
 - B. Issuing on-the-run sovereign government debt.
 - C. Issuing a corporate bond that is below investment grade.

MODULE 7.2: MODELING RETURN



Video covering
this content is
available online.

LOS 7.d: Describe and interpret a model for fixed-income returns.

Expected fixed-income return can be viewed as having five components. These components could be projected to calculate expected return or calculated after the fact to decompose sources of return actually earned. The following example explains this approach and the required calculations. While it appears formidable in aggregate, it is a combination of simple time value of money calculations and bond math concepts covered at earlier levels. For a bond portfolio, it uses aggregate portfolio data and that aggregation is provided. Otherwise, there is too much weighted average calculating to be practical without access to spreadsheets.

EXAMPLE: Expected return of a bond portfolio

A fixed-income strategist wishes to forecast the expected return of a bond portfolio for the next year. She gathers the following information and assumes no reinvestment of cash flow:

Par value (notional principal) in millions	50
Average coupon rate of portfolio	3.0%
Coupon frequency	Semiannual
Horizon analysis	1 year
Average bond price of portfolio	101.500
Projected bond price in one year if yield curve is unchanged	102.419
Average bond convexity (C) of portfolio	28
Average bond duration (modified duration or MD) of portfolio	5.60
Expected average benchmark YTM change	-0.54%
Expected change in spread	-0.06%
Expected gains or losses versus investor's currency (for 40% of portfolio allocated to foreign bonds)	+3.925%

Projected return:

Component 1, **coupon income**:

$$\text{annual coupon payment} / \text{current bond portfolio price} = 3.0 / 101.50 = 2.956\%$$

Because this example assumes no cash-flow reinvestment, it does not matter that the coupons are paid semiannually. With a 3.0% annual coupon rate, 1.50 will be received in 6 and 12 months for total coupons collected of 3.00 per 100 par. Collected coupon amount divided by initial price is the coupon income of the portfolio, sometimes referred to as current yield.

Component 2, **rolldown return**:

This is a projection of the bond prices in the portfolio assuming the yield curve is unchanged. For example, suppose the portfolio were made up only of a 7-year bond priced to yield 2.76% with a price of 101.50. Further assume the initial yield curve is upward sloping and the 6-year bond yields 2.56%. A bond pricing model could be used to project the price of the 7-year bond in one year when it is a 6-year bond priced at a 2.56% yield. (Note that this is not necessarily a simple analysis for a portfolio of bonds and would have to be done bond by bond and then aggregated. That is why it is a given value in the data provided). The rolldown return is calculated as follows:

$$(\text{end of horizon period projected price} - \text{beginning price}) / \text{beginning price} = (102.419 - 101.50) / 101.50 = 0.905\%$$

Note that if the yield curve is flat and a bond is initially priced at a premium (discount) to par, the projected price at end of period will be lower (higher) than the start-of-period price as the bond's price is pulled to par at expiration. With a sloped yield curve, that may not always be true in the shorter run (before maturity). It is true that if the yield curve is upward (downward) sloping, the rolldown return will be higher (lower) than the start-of-period YTM because the bond will decline in the

remaining term to maturity over the horizon period and be priced at a lower (higher) YTM at the end of that period.

Components 1 and 2 are sometimes combined and called the **rolling yield**:

$$2.956 + 0.905 = 3.86\%$$

Component 3, **expected price change due to change in benchmark yield (ΔY)**:

Let's assume the projected price based on rolldown of 102.419 is in fact an aggregate portfolio benchmark yield (YTM) of 2.56%. The analyst then projects a 54-basis-point decline in yields versus the 2.56% yield used in the rolldown calculation. Expected price change is calculated from the investor's expected change in benchmark yield using the portfolio's duration and convexity:

$$(-MD \times \Delta Y) + (\frac{1}{2} \times C \times \Delta Y^2) = (-5.6 \times -0.0054) + [\frac{1}{2} \times 28 \times (-0.0054)^2] = 0.03024 + 0.00041 = 3.065\%$$

Notice that the convexity effect is very small and only adds 0.041% to the return. Convexity is a second-order effect and is often insignificant for option-free bonds unless the ΔY is very large. If the portfolio includes bonds with embedded options, then effective duration and effective convexity must be used. Floating-rate securities would also complicate the analysis, as their duration is low, but will still have a sensitivity to changes in spreads, as discussed next.

Component 4, **expected price change due to change in credit spreads (ΔS)**:

The analyst also projects a 6-basis-point narrowing of spreads over the investment horizon. This change in spread is assumed to flow through to change the bond's yield. The impact of this change in spread on the bond's price can be calculated in a similar way to the duration and convexity formula used in the previous component:

$$(-MD \times \Delta S) + (\frac{1}{2} \times C \times \Delta S^2) = (-5.6 \times -0.0006) + [\frac{1}{2} \times 28 \times (-0.0006)^2] = 0.00336 + 0.000005 = 0.337\%$$

Component 5, **expected gains or losses versus investor's currency**:

The portfolio is invested 40% in foreign denominated bonds, and the investor expects the foreign currencies (weight to reflect portfolio exposures) to appreciate 3.925%, giving the portfolio an expected gain of $3.925\% \times 0.40 = 1.570\%$.

In summary, the projected bond return is the sum of these:

1. Coupon income: annual coupon amount / current bond price
 $3.0 / 101.50 = 2.956\%$
2. Rolldown return: (projected ending bond price (BP) – beginning BP) / beginning BP; based on no change in the yield curve
 $(102.419 - 101.50) / 101.50 = 0.905\%$
3. Price change due to investor's benchmark yield change predictions: $(-MD \times \Delta Y) + (\frac{1}{2} \times C \times \Delta Y^2)$
 $[-5.6 \times (-0.0054)] + [\frac{1}{2} \times 28 \times (-0.0054)^2] = 3.065\%$

4. Price change due to investor's spread change predictions: $(-MD \times \Delta S) + (\frac{1}{2} \times C \times \Delta S^2)$

$$[-5.6 \times (-0.0006)] + [\frac{1}{2} \times 28 \times (-0.0006)^2] = 0.337\%$$

5. Currency gain or loss: projected change in value of foreign currencies weighted for exposure to the currency

$$3.925\% \times 0.40 = 1.570\% = \text{expected total return for the year} = 8.833\%$$

Note the rolling yield = #1 + #2 = 2.956% + 0.905% = 3.86%.

Except for yield income, this analysis is based on projections. Rolldown assumes the yield curve is unchanged. But techniques for plotting the yield curve vary. Plotting is often done using on-the-run government bond yields, and then the curve is interpolated between those points. At times, the curve may be based on off-the-run government bond yields. Such bonds are more numerous, but the yields usually include a liquidity premium. Predicted price change is based on only duration and convexity projection. It does not include how individual bonds may shift in relative valuation. Credit losses and currency G/L are pure predictions.



PROFESSOR'S NOTE

Technically, spread duration should be used in the calculation for Part 4, but our example follows the example as presented in the CFA curriculum. The assumption here seems to be that the spread duration of a fixed-coupon bond should be similar to the modified duration of the bond. While this is a fair approximation for a fixed-coupon bond, it is not a good assumption for floating-rate bonds where modified duration is likely to be low (because coupons move in line with benchmark rates), but spread duration is likely to be high (because increases in spread do not flow through to higher coupons). This is addressed more fully in a later reading on credit strategies. If given both effective duration and convexity and spread duration and convexity in a question, use effective duration for Part 3 and spread measures for Part 4.

This return decomposition is a framework that is used to analyze the returns from active strategies over the next two readings. This is a **very** important series of calculations!

MODULE 7.3: LEVERAGE AND TAX ISSUES



Video covering this content is available online.

LOS 7.e: Discuss the use of leverage, alternative methods for leveraging, and risks that leverage creates in fixed-income portfolios.

Leverage is a way to increase portfolio return and is particularly attractive in periods of lower interest rates (and expected return). (The return on the portfolio can also be called the return on investor's investment or equity in the portfolio.) As long as funds can be borrowed (B) at rates below the return earned on the investments made ($r_I > r_B$),

leverage will enhance portfolio return. Leverage also increases the exposure of the portfolio to interest rate risk and losses if interest rates increase above the return on portfolio assets ($r_I < r_B$). Borrowing is normally done at shorter-term interest rates, and those costs can increase faster than return on assets if interest rates increase. Said another way, the asset duration normally exceeds the liability duration in a leveraged portfolio.

The leveraged portfolio's return (return on investor equity) can be calculated as:

$$r_p = \text{portfolio return (amount) / portfolio equity}$$

$$r_I + [(V_B / V_E) \times (r_I - r_B)]$$

where:

$$r_p = \text{return on portfolio}$$

$$r_I = \text{return on invested assets}$$

$$r_B = \text{rate paid on borrowings}$$

$$V_B = \text{amount of leverage}$$

$$V_E = \text{amount of equity invested}$$

There are multiple ways to achieve leverage.

Repurchase agreements (repos) are an explicit way to borrow funds that could be used for leveraging. A securities owner "sells" a security for cash and simultaneously agrees to "buy" it back at a specified future date. The repo is functionally a way to borrow money, and the assets are the collateral for the loan. The loan term is often overnight, though the repo could be renegotiated the next day at a new interest rate. Longer repo terms are also possible. The borrowing nature of the transaction is even more evident in the details of the transaction. A securities dealer might enter an overnight \$100,000,000 repo at a 2.5% repo rate. This means the dealer receives 100,000,000 and pays back $100,000,000 \times [1 + (0.025 / 360)]$ the next day. (This is the normal calculation methodology for repo rates.)

The actual securities "sold" are not typically specified, and the money borrower can deliver any types previously agreed to. This is called general collateral. For example, any domestic government bonds can be delivered, and their market value must equal 102% of the repo amount, in this case \$102 million. The 2% is a haircut amount and provides additional security to the money lender. The lender now holds collateral worth more than the funds lent. The collateral is returned the next day (for an overnight repo) when the loan is repaid. Other kinds of collateral can also be allowed to secure the loan, and the haircut would be larger for riskier and less liquid securities. In other words, the repo rate may not need to be adjusted based on the quality of the collateral because the amount of collateral is adjusted.

The repo can be bilateral with cash and collateral securities directly exchanged between the two counterparties or tri-party. Tri-party repos use an intermediate third party (usually a bank) who holds the underlying collateral for the two counterparties and records the exchange of ownership. That is less costly than actually exchanging ownership between the two counterparties.

The above repo is cash driven and any collateral (previously agreed to by the parties to the repo) can be used. Repos can also be security driven. In a security driven repo, the

money lender wants to have temporary possession of specific collateral. They may need it for some hedging or arbitrage reason and could offer a lower repo rate in exchange for delivery of a specific security. The repo is now a form of securities lending (and will be discussed later).

Futures contracts also provide leverage. Futures contracts can be purchased and require only a small initial margin deposit. The contract price times multiplier is the full price of the contract and the quantity of the underlying security now controlled. In other words, buying a bond contract at a full price of \$105,607 requires only a small margin deposit but provides the upside and downside of buying that full amount of underlying bonds. The amount of leverage achieved can be calculated as:

$$\text{leverage} = (\text{notional value of contract} - \text{margin amount}) / \text{margin amount}$$

Swap agreements also provide leverage. Entering a 10 million notional 5-year receive 4% fixed versus pay LIBOR swap is equivalent to buying 10 million of 5-year 4% bonds and borrowing 10 million at a floating rate of LIBOR. A receive-fixed swap increases the portfolio's exposure to the bond market and its duration with no explicit investment of funds. A receive-floating versus pay-fixed swap would have the opposite effect.

Traditionally, swaps did not require posting of collateral and were largely unregulated and unreported; the 2008–09 financial crisis has led many swap users to settle swaps through a central clearinghouse, providing some of the benefits of standardization and exchange trading.

Securities lending, as mentioned earlier, is closely related to the repo market, but the motivations are different. Securities lending often supports short selling. Short selling means selling a security that is not owned and receiving immediate payment for the security. In many cases, the security must be immediately delivered, so the short seller must borrow the security from someone else (and later return the security). A bilateral repo can be used to do this. The securities borrower specifies the desired security or securities to be received. The lender of the securities will specify the amount and types of collateral that the securities lender will receive back.

The lender of the securities can specify receiving cash in exchange for the securities lent. The securities lender can then invest the cash (which is typically greater than the value of the securities lent) to earn interest and compensation. The securities lender could also agree to accept back general, high-quality government bonds as collateral. Suppose the securities lender lends 10 million of a specific bond and receives back 10.5 million of various government bonds in exchange. The securities lender earns the interest on that collateral. If those earnings are higher than the fair compensation for the securities lent, a portion might be rebated to the securities borrower. The rebate rate equals:

$$\text{rebate rate} = \text{collateral earnings rate} - \text{security lending rate}$$



PROFESSOR'S NOTE

Think of it as I need 50 million of Bond X; you have it and will lend it to me if I compensate you. You will take back as collateral some larger amount (say 105%) of cash or general (not specific) government securities. You can use that collateral to find another way to make some money, and if I really needed

Bond X, this could induce me to pay you other explicit fees. Obviously, this is a very specialized market used by a small number of large participants.

Unlike the repo market, security lending agreements are usually open ended. They do not have a specified maturity and continue until one counterparty requires settlement, reversing the transaction with return of the collateral. This can create additional risk if the other counterparty was not prepared to reverse his part of the transaction.

Ultimately, the earnings of the securities lender depend on how badly the securities borrower needs that specific collateral. If the need is high, the securities lender can demand an explicit fee. The securities lender can also demand more cash be posted as collateral or require more general collateral to be delivered. Either increases what the securities lender can earn.

Risks Created by Leverage

In addition to the obvious risk, if the costs of borrowing increase above the earnings on the portfolio assets, other risks are also created. If interest rates increase, the value of the leveraged portfolio and collateral will decline. This may induce money lenders to demand repayment and force liquidation of portfolio assets when they are down in value. This is referred to as a fire sale, selling under distressed conditions. If such liquidations are widespread, they can produce a vicious cycle as each round of sales drives down prices, leading other credit providers, repurchase participants, and securities lenders to demand repayment and/or stop lending.

Managing Taxable and Tax-Exempt Portfolios

LOS 7.f: Discuss differences in managing fixed-income portfolios for taxable and tax-exempt investors.

Both tax-exempt and taxable investors should seek the highest possible risk-adjusted return net of fees and transaction costs, consistent with their objectives and constraints. This is more complex for taxable investors because taxes must also be taken into account to determine after-tax return and risk. Different types of tax issues arise and differ by tax jurisdiction around the world. The following are some examples:

- The two sources of bond return are usually taxed differently. Income may be taxed at a different rate from capital gains (price change). Both are usually taxed only when realized, but there are exceptions. For zero-coupon bonds, imputed income (increase towards par) may be taxed each year as income even though there is no cash flow.
- In general, capital gains are only taxed at sale and at a lower tax rate than for interest income. Gains on securities held for a longer period may be taxed at a lower rate than on securities held for a shorter period.
- Capital losses may only be allowed to be used to offset capital gains, but not other income sources. But if capital losses exceed gains, they may be carried forward to offset future realized gains. (In some cases, the realized losses can be carried back to reduce taxes already paid for a previous year, generating a tax reduction or refund on the current tax return.)

- It may be possible to invest some portions of the portfolio in tax-sheltered or tax-advantaged accounts.

Strategies to use in managing taxable accounts include:

- Realize capital losses to offset gains. This can include selective tax loss harvesting for partial sales when the investment was acquired at multiple prices.
- Extend holding periods to realize long-term, rather than short-term, capital gains.
- Extend holding periods to defer taxes.
- Consider differentials in income versus gain tax rates when selecting investments.

Taxation of investments in mutual funds and other collective investment funds varies by country. Income on the underlying assets is usually taxable to the fund investors when it is earned by the fund, regardless of whether the income is paid out or reinvested in the fund. However, the taxation of gains realized within the fund varies.

- Some countries use pass-through taxation of gains. The fund investor is taxed when the fund realizes the gain and that tax payment subsequently reduces taxes on gains when the investor sells the fund shares.
- Other countries use deferred taxation of the gains realized within the fund and instead tax the investor on all gains when the fund shares are sold.

In contrast, when a client hires a manager to manage the client's portfolio directly (a separately managed account) all income, gains, and losses in the portfolio are normally reported on the client's tax return and taxable to the client.

EXAMPLE: Taxable vs. tax-exempt portfolios

A manager must raise EUR5,000,000 to meet a client's need for funds. The client's portfolio is separately managed, and all tax issues are passed through and immediately taxable to the client. Income and capital gains tax rates are 38% and 15%, respectively. The manager is looking at two bonds and will sell all of one or of the other. Both have market value of EUR5,000,000 and have the same remaining maturity, coupon, and credit quality. Any taxes owed due to the sale are to be ignored in the analysis and covered by other client funds. Bond A has a significant unrealized gain, while bond B has a significant unrealized loss. The manager believes the bonds are substantially identical except bond B has a slightly higher yield.

Select the bond the manager will sell and **explain** why if the investor is (1) taxable, or (2) tax-exempt.

Answer:

1. Taxable: Sell bond B to avoid realizing a gain and paying a tax now.
2. Tax-exempt: Sell bond A to retain bond B and its slightly better yield.



MODULE QUIZ 7.2, 7.3

1. Suppose that a bond portfolio has 25 million in notional principal and an average annual coupon rate of 5%. The average bond duration of the portfolio is computed as

8, and the average convexity of the portfolio is 0.5. If an investor in this portfolio expects the average yield change to be 0.35% with no change in spread, the expected portfolio price change due to the investor's forecast is *closest* to:

- A. -1.752%.
 - B. -2.799%.
 - C. -3.978%.
2. A credit investor is interested in using leverage in his portfolio to enhance return. Which of the following statements is *most correct* regarding the use of leverage and the risks that leverage creates when implemented in fixed-income portfolios?
- A. If interest rates increase, the value of the leveraged portfolio and collateral decline.
 - B. Liability duration normally exceeds asset duration.
 - C. As long as funds can be borrowed at rates above the return earned on the investments made, leverage will enhance portfolio return.
3. When managing fixed-income portfolios for taxable investors, which of the following strategies should *most likely* be applied?
- A. Realize capital gains to offset any losses.
 - B. Shorten holding periods to realize long-term, rather than short-term, capital gains.
 - C. Consider differentials in income versus gain tax rates when selecting investments.

MODULE 7.4: LDI AND MANAGING INTEREST RATE RISK



Video covering this content is available online.

LOS 7.g: Describe liability-driven investing.

Broadly speaking, liability-driven investing (LDI) is used when there are definable future liabilities to be paid from portfolio assets. It is classified as passive total return, but in this context, that does not mean nothing should be done—as many of these strategies require continual monitoring and adjustments. (In contrast, active management generally means managing to outperform a specified index or benchmark.) The specific LDI approach used depends on the nature of the liabilities. LDI is mostly used for institutional portfolios. There are some commonly used terms:

- **Asset-liability management (ALM)** means strategies that consider assets in relation to liabilities. These strategies are appropriate when both the present value (PV) of the assets and liabilities change with changing interest rates.
- **Liability-driven investing (LDI)** takes the liabilities as a given and manages the assets to meet those future liability values—for example, an insurance company or defined benefit (DB) pension plan must fund future liability payouts. (Note that LDI is now being used in a more specific way than in the initial paragraph. The focus of this reading is on this more specific type of LDI, where the liabilities are taken as a given and the assets are managed in relation to those liabilities.)
- **Asset-driven liabilities (ADL)** takes the assets as a given and manages or adjusts the liabilities in relation to those assets. With ADL, the debt manager designs a liability structure to manage interest rate risk. For example, a leasing company with specific

types of floating- or fixed-rate financial assets may structure its liabilities to match the characteristics of those assets.

LDI can also apply to individuals, particularly when the goal is to accumulate sufficient funds to meet retirement. Consider a married individual who plans to retire in 12 years and is planning to use the value of his bond portfolio to fund the purchase of an annuity. He will reinvest any cash flows from the bonds and could also plan to add a regular amount to the bond position every year to meet the goal.

Four types of liabilities exist:

1. **Known future amount(s) and payout dates(s), called Type I.** The issuer of an option-free fixed-rate bond has this type of liability. We will see that these are the easiest type of liability to model.
2. **Known future amount(s) but uncertain payout dates(s), called Type II.** The issuer of a callable or puttable bond has this type of liability. An insurance company selling term life insurance also fits here. The amount of payout is known, but the date of payout on any single policy is not. (However, actuaries can apply the law of large numbers to estimate likely payout amounts in any given period with considerable accuracy.)
3. **Uncertain future amount(s) but known payout dates(s), called Type III.** Floating rate instruments and real rate bonds such as Treasury Inflation Protection Securities (TIPS) fall in this category.
4. **Uncertain future amount(s) and uncertain payout dates(s), called Type IV.** Property and casualty as well as some DB plan liabilities fall in this category.

Simple duration (Macaulay or modified) is adequate to model Type I liabilities. The others require effective duration—modeled to reflect the initial shape of the yield curve plus assumed upward and downward shifts in the yield curve to estimate the potential amount and timing of liability payouts.

Immunizing Multiple Liabilities

LOS 7.h: Describe the strategy of cash flow matching.

LOS 7.i: Describe construction, benefits, limitations, and risk–return characteristics of a laddered bond portfolio.

Cash flow matching is the simplest but least flexible approach to immunizing. For a single liability, buy a zero-coupon bond with par and maturity matching the liability. With no cash flows to reinvest or bonds to sell, there is no cash flow or price risk. The bonds must also be default free. In some cases, this may allow *accounting defeasance* where the assets are legally set aside and dedicated to meet the liabilities—allowing both those assets and liabilities to be removed from the balance sheet of the organization responsible for paying the liability.

- Cash flow matching of a stream of liabilities may also be possible using coupon-bearing bonds. In concept, a bond is purchased due on and with par plus (+) final coupon to exactly fund the longest liability. Its earlier coupon payments can be used

to partially meet the earlier liabilities. Then, in recursive fashion, the next-longest liability is funded by buying a bond due on and with par plus (+) final coupon to exactly fund that next-longest liability (after considering the coupon of the bond or bonds already purchased for the longer liability or liabilities).

- In practical terms, it is unlikely that the coupon-bearing bonds necessary for perfect cash flow matching will exist. A *cash-in-advance* constraint could be used, requiring the bond used to fund a specific liability to mature before the required payout date of the liability. This would expose the portfolio to reinvestment risk in an upward-sloping yield curve. The upward-sloping curve is anticipated to create reinvestment risk because as cash comes in to be reinvested for a short time period until payout, the reinvestment must be at the lower rates at the short end of the curve.

Laddered portfolios can be used in cash-flow matching multiple liabilities. A laddered portfolio has roughly equal par amounts purchased across different maturities. The same duration could also be achieved by concentrating all the holdings in a single middle duration (a bullet portfolio) or in a combination of shorter and longer duration holdings (a barbell portfolio). If all three portfolios have the same duration, they all have roughly the same price sensitivity to a parallel yield curve shift. The advantages of the laddered portfolio include the following:

1. The portfolio has regular liquidity, as some bonds come due each year. This is particularly significant if less liquid bonds such as corporates are used because the need to sell bonds at large bid-ask spreads to generate required cash flows is reduced. These near-to-maturity bonds would also be treated as less risky collateral and could be used to borrow at favorable interest rates.
2. There is broad diversification of cash flow across time and the yield curve and less concentrated exposure to nonparallel changes at specific maturities on the curve.
3. There is diversification between price risk on long-dated bonds and reinvestment risk on short-dated bonds. The bonds that mature each year can be reinvested at long-term, typically higher, rates, keeping the overall duration of the portfolio stable over time.
4. The laddered portfolio will have more convexity than the bullet, a benefit if there are large parallel shifts. Recall that convexity is directly related to the dispersion of cash flows across time. Note that the ladder, however, will not be as convex as a barbell portfolio.
 - An alternative to building laddered bond portfolios with individual bonds is to use a laddered portfolio of **target-date** (fixed-maturity) bond ETFs. Each ETF has a designated year when it will mature and be paid off. It is passively managed to replicate the performance of a bond maturing in that year. For many investors, the ETF will offer cost advantages compared with purchasing individual bonds and have more liquidity if unanticipated sales are needed.
 - Laddered portfolios do have some disadvantages. For some investors, an ongoing (no target date) passive index or active bond fund may be better. These ongoing funds are likely to be larger, provide greater diversification of credit risk, and be more liquid than directly investing in the underlying bonds.

MODULE QUIZ 7.4

1. A bond issuer is reviewing the four main categories of liabilities. He is interested in issuing a liability that can be managed easily and has known future amounts and payout dates. Which of the following types of liabilities *most likely* meets the issuer's demands?
 - A. Callable bonds.
 - B. Option-free fixed-rate bonds.
 - C. Treasury inflation-protected securities.
2. A client at RBI Funds would like to build a laddered bond portfolio. In terms of the construction and advantages of a laddered portfolio, which of the following statements is *most correct*?
 - A. With a laddered portfolio, the investor is diversified between price and reinvestment risk.
 - B. A laddered portfolio has more reinvestment risk in any single year compared to a barbell portfolio.
 - C. The more distributed cash flows of a ladder portfolio compared to a bullet portfolio will provide less convexity.

KEY CONCEPTS

LOS 7.a

Fixed income as an asset class provides three major roles when added to an investment portfolio: diversification, regular cash flows, and inflation protection (in the form of floating-rate securities and inflation-linked securities).

There are two major classifications of fixed-income mandates: liability-based mandates, which invest to fund future liabilities, and total return mandates, which invest to track or beat a benchmark.

Types of liability-based mandates include cash-flow matching, duration matching, and contingent immunization strategies.

- Cash-flow matching funds liabilities with coupon and par amounts received on the dates the liabilities are paid.
- Duration matching matches asset and liability duration to achieve comparable results. Duration matching generally gives more flexibility in asset selection and, therefore, may meet the objective at a lower cost.
- Contingent immunization is a hybrid of active management with potential immunization. The portfolio must initially be overfunded and can be actively managed. If successful (unsuccessful), the surplus will grow (be lost) and the ultimate cost will end up being lower (higher) than from immunization.

Types of total return mandate include:

- Pure indexing, which exactly matches the holdings of the index.
- Enhanced indexing, which allows modest deviations (but matches duration to control interest rate risk).

- Active management, which does not restrict deviations versus the index and allows duration mismatches.

LOS 7.b

Bond risk and return measures include the following:

- Macaulay duration is the weighted average time to receive cash flows.
- Modified duration is the estimated percentage change in a bond price given a 1% change in yield [measured as Macaulay duration / (1 + the periodic yield of the bond)].
- Effective duration is the modeled estimated percentage change in a bond price given a 1% change in a benchmark curve. It is used for bonds with embedded options.
- Key rate duration (partial duration) is the estimated percentage change in a bond price given a 1% change in a key benchmark maturity yield while other yields remain the same.
- Empirical duration is the actual sensitivity of a bond's price relative to movements in a benchmark rate from a linear regression.
- Money duration (dollar duration) equals modified duration × market value. It gives a sense of size, as well as sensitivity.
- Price value of a basis point [DV01 or basis point value (BPV)] equals money duration × 0.0001. It measures the absolute currency sensitivity to a basis point move in rates.
- Convexity measures the curvature of the relationship of price and yield. More-convex bonds are expected to outperform less convex bonds when yields shift.
- Effective convexity models convexity when cash flows are not certain. It is used for bonds with embedded options.

Macaulay duration increases linearly with maturity.

Convexity is approximately proportional to duration squared.

Convexity is also directly related to the dispersion of cash flows in time around the Macaulay duration.

To aggregate duration and convexity measures for a portfolio of fixed-income assets, the cash-weighted average of the durations and convexities of the individual bonds is usually used.

Spread duration is the sensitivity of a bond's price to a unit change in spreads.

Duration times spread (DTS) = spread duration × credit spread. It reflects the fact that bonds with larger spreads tend to have larger movements in spread.

A manager who expects interest rates to rise (fall) will lower (increase) duration.

A manager who expects credit spreads to widen (narrow) will lower (increase) spread duration.

Relative value analysis involves the ranking of individual bonds according to fundamental value drivers in order to pick the best securities to express a top-down view on markets.

Liquidity in the bond market (ability to buy or sell on a timely basis at or near fair market value) is substantially lower than in equity markets.

Most bonds do not trade or trade infrequently after issuance (said to go “off-the-run”).

The sheer number and variety of individual bond issues is immense.

The market is mostly over-the-counter with trade price and volume not reported.

Liquidity is highest for sovereign government, higher-quality, and most recently issued (on-the-run) bonds.

Smaller issues are generally less liquid.

Effects:

- Bond pricing data is more difficult to obtain.
- Portfolio managers have to choose between more-liquid bonds or less liquid bonds that may offer a liquidity premium.
- Derivatives and ETFs are generally more liquid and an alternative to direct investment in bonds.

LOS 7.d

Return can be projected (or actual return decomposed) as the sum of the following:

1. Coupon income: annual coupon amount / current bond price.
2. Rolldown return, assuming no change in yield curve: (projected ending bond price (BP) – beginning BP) / beginning BP.
3. Price change due to investor yield change predictions: $(-MD \times \Delta Y) + (\frac{1}{2}C \times \Delta Y^2)$.
4. Price change due to investor spread change predictions: $(-MD \times \Delta S) + (\frac{1}{2}C \times \Delta S^2)$.
5. Currency G/L: projected change in value of foreign currencies weighted for exposure to the currency.

Coupon income + rolldown return may be referred to as rolling yield.

LOS 7.e

- Leveraged portfolio return can be calculated as $r_I + [(V_B / V_E) \times (r_I - r_B)]$.
- If r_I exceeds (is below) r_B , the leverage enhances (reduces) portfolio return.
- Repurchase agreements (and securities lending), futures contracts, and swaps can all be used to leverage return.
- In addition to the detrimental effects if r_I is less than r_B , the lender of the funds can demand repayment, forcing liquidation of portfolio assets at fire sale prices, which can feed a financial crisis.

LOS 7.f

Taxes complicate portfolio management, as managers seeking to maximize return must consider the different tax effects of each portfolio decision.

Liability-driven investing is a form of asset-liability management (ALM) that manages the assets in relation to the characteristics of the liabilities. This is easier when the future liability payouts are known in amount and timing. The liabilities are essentially the benchmark for making decisions.

Asset-driven investing is a less common form of ALM and adjusts the liabilities in relation to the characteristics of the assets.

LOS 7.h

Multiple liabilities can be cash flow matched with a portfolio of zero-coupon bonds or coupon-bearing bonds whose cash flows (P&I) most closely match the liability payouts.

LOS 7.i

Laddered portfolios have the following qualities:

- They can be useful in cash flow matching multiple liabilities.
- They provide diversification across the yield curve and natural liquidity as a portion of the bonds come due each year. In an upward-sloping yield curve, this can also be desirable as each maturing bond is rolled over into the longest (and highest-yielding) maturity used in the ladder.
- They have more convexity than a bullet portfolio because their cash flows are more distributed.
- They could be constructed with a sequence of target-date ETFs as an alternative to individual bonds.

ANSWER KEY FOR MODULE QUIZZES

Module Quiz 7.1

1. **B** Inflation-linked bonds provide direct protection for the effects of inflation. They protect coupon payments from inflation and adjust par (i.e., principal) for inflation. Floating-coupon securities also provide protection from change in inflation, but the adjustment mechanism is different and only affects the coupon. Fixed-coupon bonds do not protect coupons or principal from the effects of inflation. (LOS 7.a)
2. **C** Pure indexing attempts to replicate the performance of a bond index. It seeks to exactly match all of the risk factors of the index while still allowing the manager some leeway on the individual bonds selected. Enhanced indexing allows some additional flexibility in constructing the portfolio and seeks to add some modest active return. Active management allows much larger deviations from the risk factors of the index and seeks greater active return. (LOS 7.a)
3. **B** Liquidity for on-the-run high-quality sovereign government debt is high and declines somewhat for older off-the-run issues. These government bonds are usually large in size and have a high level of credit quality. Liquidity among

corporate bonds typically declines with lower quality as the bonds become riskier and with the size of the issue (i.e., smaller issuers are less liquid). (LOS 7.c)

Module Quiz 7.2, 7.3

1. **B** Expected price change is calculated from the investor's expected change in yield using the portfolio's duration and convexity as follows: $(-MD \times Y) + (\frac{1}{2}C \times Y^2) = (-8 \times 0.0035) + (\frac{1}{2} \times 0.5 \times 0.0035^2) = -0.028 + 0.000003 = -2.7997\%$. Note that the expected change in spread is zero; hence, there is no impact on price from changes in spread. (Module 7.2, LOS 7.d)
2. **A** If interest rates increase, the value of the leveraged portfolio and collateral decline. As long as funds can be borrowed at rates *below* the return earned on the investments made, leverage will enhance portfolio return. Asset duration normally *exceeds* the liability duration in a leveraged portfolio. The other statements are false because a typical leverage transaction involves borrowing at lower shorter-term rates (and therefore in a liability with low duration) to invest at longer-term higher rates (and therefore in an asset with higher duration). (Module 7.2, LOS 7.d)
3. **C** Strategies to use when managing taxable accounts include:
 - Realize capital *losses* to offset *gains*.
 - *Extend* holding periods to realize long-term, rather than short-term, capital gains.
 - Consider differentials in income versus gain tax rates when selecting investments.
 (Module 7.3, LOS 7.f)

Module Quiz 7.4

1. **B** Type I liabilities have known future amounts and payout dates. The issuer of an option-free fixed-rate bond has this type of liability. These are the easiest to manage liabilities because their sensitivity to interest rate movements can be modeled using modified duration. Callable bonds have known future amounts, but uncertain payout dates (Type II). Real rate bonds, such as Treasury inflation-protected securities, have uncertain future amounts, but known payout dates (Type III). (LOS 7.g)
2. **A** With a laddered portfolio, the investor is diversified between price and reinvestment risk. Some bonds mature each year and can be reinvested if rates are high. This creates a form of dollar cost averaging over time. The ladder has less reinvestment risk in any single year versus the barbell (or bullet). The more distributed cash flows of the ladder compared to the bullet will provide greater convexity—benefiting performance for large changes in rates. (LOS 7.i)

READING 8

ASSET ALLOCATION TO ALTERNATIVE INVESTMENTS

EXAM FOCUS

Candidates should understand the potential benefits of adding alternative investments to a portfolio of publicly traded equities and debt, and the factors that enter into the determination of an optimal allocation to alternative investments. Candidates will develop an understanding of the characteristics of different types of alternative investments that affect the asset allocation decision. They should be able to contrast factor based optimization with mean-variance optimization. Candidates must pay special attention to liquidity concerns with alternative investments and how an investor's time horizon affects the suitability of specific types of alternative investments.

MODULE 8.1: ROLE OF ALTERNATIVE INVESTMENTS AND DEFINING THE INVESTMENT OPPORTUNITY SET



Video covering this content is available online.

LOS 8.a: Explain the roles that alternative investments play in multi-asset portfolios.

Alternative investments refers to various types of investments including hedge funds, private equity, private credit, commercial real estate, and real assets. There are also different types of investments, with somewhat different characteristics, within each of these categories. Real assets include agricultural commodities, precious metals, industrial metals, agricultural land, and oil. Hedge funds pursue a variety of strategies, including long-short hedging, short bias, risk arbitrage, and various quantitative investment strategies. Private equity funds might specialize in existing health care firms or venture capital investments. Each of these will have somewhat different risk and return characteristics as well as different correlations with the returns of traditional investments.

Overall, the goal of adding alternative investments to a portfolio is most often to improve the portfolio's risk and returns profile (e.g., increase the portfolio's **Sharpe ratio**). This can result from investing in assets that increase expected returns, have low risk, or, often, have low returns correlations with other portfolio assets so that

diversification across asset classes reduces portfolio risk without sacrificing return. Additionally, investors may seek alternative investments that provide income, the potential for capital growth, or safety (preservation of value).

Private equity and private credit may be viewed primarily as return-enhancing (and risk-increasing) portfolio investments. Real assets may be viewed as risk-reducing (and thus, lower-return) investments. Hedge funds can fall anywhere along this spectrum, depending on the strategies pursued by their managers.

Equity investments, both public and private, typically provide capital growth. Investments in bonds or real estate may generate income. Real assets, and some hedge fund strategies, may diversify risk for an equity portfolio, while private credit may diversify the risk profile for a fixed-income portfolio that is primarily exposed to interest rate risk. Precious metals or government bonds may be seen as safe-haven asset classes.

Hedge funds. Some hedge fund strategies, such as equity long/short or short bias, may somewhat reduce a portfolio's overall equity beta but are mainly expected to increase returns through their managers' security selection skill. Other hedge fund strategies, such as merger arbitrage or global macro, may be less correlated with traditional asset classes.

Private equity. For a portfolio of public equity securities, an allocation to private equity has limited diversification potential because public and private companies face essentially the same risk factors. Thus, the main function of private equity in the portfolio is to increase expected returns.

Private credit. This class of alternative investments include both direct lending and distressed debt. Direct lending is primarily an income-producing investment. For a given range of credit quality, the risk-return profile tends to be similar for direct lending and publicly traded debt, except that direct lending has additional risk (and an expected return premium) due to its illiquidity. Distressed debt has a risk-return profile more like equity securities because factors specific to the issuer have a greater effect on the debt's performance than factors that affect fixed-income investments in general.

Commercial real estate. Real estate investments can hedge inflation risk. Both rental income and the value of properties owned may increase with inflation.

Real assets. Assets such as commodities, farm and timberland, and infrastructure also protect against inflation risk. Asset holdings can target particular subsets of inflation risk, such as energy, food, or building materials. Infrastructure investments require a longer time horizon and their correlation with inflation may be limited, for example, by utility rate regulations.

LOS 8.b: Compare alternative investments and bonds as risk mitigators in relation to a long equity position.

Are alternative investments or bonds the better choice for diversifying an equity portfolio? The answer may depend on the investor's investment horizon.

For a short investment horizon, the primary risk facing the investor is returns volatility. Reducing volatility is best achieved by allocating a portion of the portfolio to an asset class with a low correlation of returns with equities.

For alternative investments as an asset class, reported volatility of returns appears lower than the volatility of equity returns, and its correlation with equity returns also appears to be low. However, these statistics are likely to be biased downward for a number of reasons:

- **Appraisal-based** valuations of privately held investments result in smoothing of reported returns.
- Databases of alternative investment returns are subject to sampling biases, such as **survivorship bias** and **backfill bias**, which result in downside risk being understated in the reported data.
- Indexes of alternative investment returns reflect some degree of diversification because funds in an index may have low correlations of returns with each other. Thus, the volatility of returns on the index is less than the average volatility of returns on index components.

As a result, both the volatility of alternative investment returns and their correlation with equity returns may be higher than they appear to be in reported data.

By comparison, bonds as an asset class have had a lower correlation with equity returns than alternative investments. In fact, over the 20 years before 2017, their correlation with equity returns has been negative. (The correlation was positive in the two decades before that, when inflation was higher.) As a result, an allocation to bonds is likely to reduce the volatility of an equity portfolio's returns more than an equal allocation to alternative investments.

With a long time horizon, however, the primary risk is not returns volatility, but failing to achieve a minimum required rate of return over time. For example, an endowment must earn an average rate of return greater than the sum of inflation and its required annual distributions. Because bonds have a lower expected rate of return than equities, allocating assets to bonds may increase the risk of a portfolio failing to earn its needed rate of return.

In this case, alternative investments can be a better choice for diversification. Their returns correlation with equities, while higher than commonly reported, is still less than perfect even after adjusting for statistical biases. Therefore they offer a potential diversification benefit to an equity portfolio. Because the expected return on alternative investments is higher than that of bonds, over a long time horizon they reduce the risk of failing to meet the portfolio's return requirements.

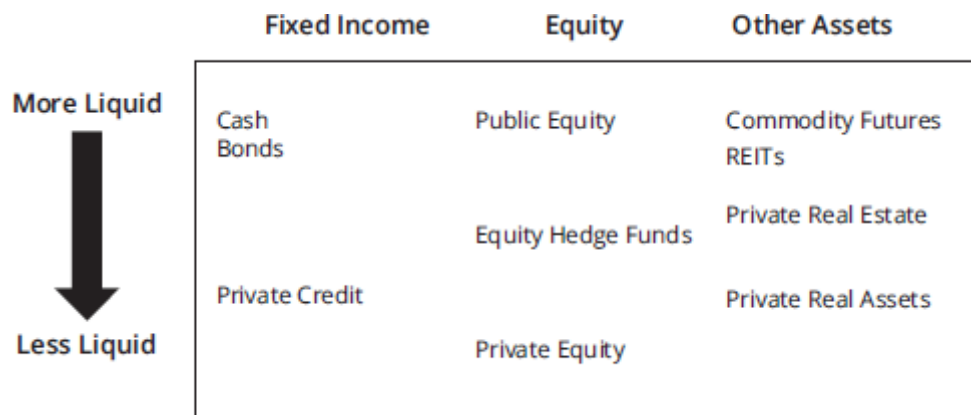
LOS 8.c: Compare traditional and risk-based approaches to defining the investment opportunity set, including alternative investments.

Traditional approaches to defining the **investment opportunity set** include classifying asset groups by liquidity or by how they perform over economic cycles.

A portfolio manager using a liquidity-based approach would distinguish between alternative investments that are publicly traded, such as futures contracts or REITs, and those that are not publicly traded. Among alternative investments that are not publicly traded, the manager would further classify them by the length of the time commitment required. For example, private equity may be viewed as an asset class that requires a longer-term commitment than private credit, while both require a longer commitment than more liquid alternative investments.

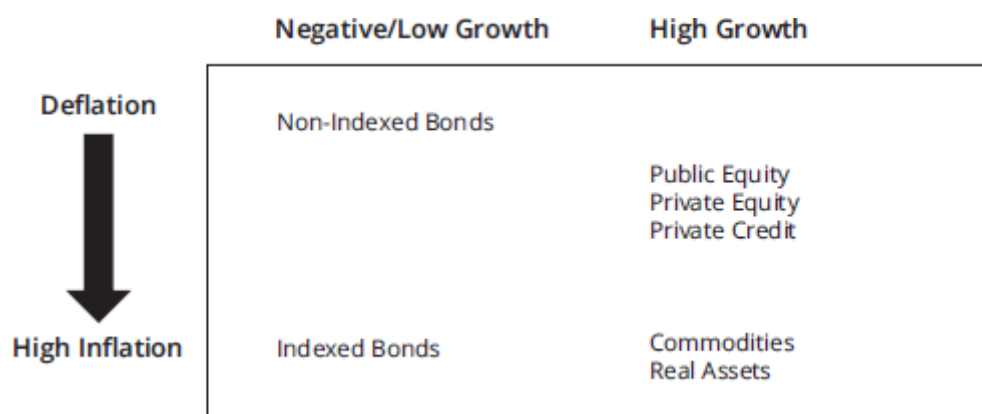
Figure 8.1 shows how asset classes might be considered based on liquidity characteristics.

Figure 8.1: Liquidity-Based Investment Opportunity Set



Another traditional approach is to classify assets by how they are expected to perform under different scenarios for economic growth and inflation. Using this approach, a manager would distinguish among asset classes that provide growth in an expanding economy (primarily equities), asset classes that hedge inflation risk (such as real assets and inflation-linked bonds), and asset classes that hedge against deflation (primarily non-inflation-indexed government bonds). Figure 8.2 shows an example of an investment opportunity set that uses this approach.

Figure 8.2: Economic Environment-Based Investment Opportunity Set



A **risk factor based approach** to defining asset classes involves statistically estimating their sensitivities to risk factors identified by the manager. Examples may include economic growth and inflation, interest rates and credit spreads, or currency

values. They may also include factors such as liquidity, capitalization, and value-versus-growth.

With respect to alternative investments, a risk factor analysis may show that some alternative investment classes are similar to traditional asset classes in terms of factor sensitivity. For example, private equity returns are sensitive to many of the same risks as public equity, while private credit has many of the same risk sensitivities as publicly traded high yield bonds.

Identifying sources of risk that are common across asset classes is one of the key advantages of a risk factor based approach. This mitigates a limitation of the traditional approaches, which may classify investments into different classes even when they face largely the same risk factors, leading a manager to believe the portfolio is more diversified than it actually is.

Another advantage of a risk-based approach is that by allowing a manager to analyze multiple dimensions of portfolio risk, this approach is useful for developing an integrated risk management framework. In this sense, it can be more useful than the traditional approaches for highlighting the primary drivers of portfolio risk.

Managers using a risk factor based approach must be aware that risk factor estimates can be sensitive to the period used for analysis. The results may also be more difficult to communicate to decision makers and to implement compared to traditional approaches.



MODULE QUIZ 8.1

1. Which of the following categories of alternative investments would be *most appropriate* for diversifying a portfolio of public equity?
 - A. Private equity and short-bias hedge funds.
 - B. Long-short hedge funds and distressed debt.
 - C. Commercial real estate and global macro hedge funds.
2. For alternative investments as an asset class, appraisal-based valuations and sampling biases are believed to overstate:
 - A. returns.
 - B. risk measures.
 - C. diversification benefits.

MODULE 8.2: CONSIDERATIONS IN ALLOCATING TO ALTERNATIVE INVESTMENTS



Video covering this content is available online.

LOS 8.d: Discuss investment considerations that are important in allocating to different types of alternative investments.

As with any asset allocation decision, an allocation to alternative investments must consider their risk, expected return, and returns correlation with the existing portfolio. An allocation to alternative investments also requires that investors consider a number of factors specific to this asset class. These include the choice of investment vehicles to

be used, liquidity concerns, expenses and fees, the tax status of the investments, and the ability to obtain the expertise needed to invest successfully.

Setting return expectations for alternative investments is made more difficult by their short history relative to other asset classes and by the limited validity of the data that are available. A suggested approach to determining an expected return for a particular class of alternative investments is to estimate each of its risk factor exposures, and add the expected returns from these exposures to the risk-free rate. An analyst may add an assumed return for the fund manager's alpha and subtract fees and taxes, in order to refine this estimate.

Several characteristics of alternative investments limit the usefulness of mean-variance optimization as a tool for determining their appropriate portfolio allocations. Because of illiquidity and valuation issues, option-like return patterns, and the fact that returns from some strategies tend to be low or negative during a drawdown period and high in later years, we cannot assume returns are normally distributed. Additionally, for alternative investments for which committed capital is not immediately invested by the manager, a portfolio's effective allocation to the asset class might be less than its target.

Investment Vehicles

A typical structure for an alternative investment vehicle is a **limited partnership**. The investment manager is the **general partner** and investors in the fund are **limited partners**. With this structure, the liability of investors in the fund is limited to the amount they have committed. Often these limited partnerships are registered offshore for tax or reporting reasons.

Investing directly in a limited partnership is appropriate for large investors that have the expertise to evaluate managers and fund strategies. They typically invest in a variety of limited partnerships to diversify the specific risks that each general partner will take on as they pursue their strategies. Limited partners sometimes co-invest with a general partner, but they cannot be directly involved in fund operations.

For investors that lack the needed expertise, investing through a **fund-of-funds** may be appropriate. A fund-of-funds manager can pool capital from investors and use it to invest in limited partnerships. Typically, a fund-of-funds manager will specialize in a particular subset of alternative investment strategies. The benefit of a fund-of-funds is that it provides access to this asset class to investors who otherwise would not have it. The drawback is that they charge an additional layer of fees above those charged by the underlying limited partnerships.

Some investors that are large enough to demand favorable investment terms may establish **separately managed accounts (SMAs)** through which to access alternative investments. SMAs have requirements for both the investor and the fund manager that can make them challenging to implement. Another approach is to establish a limited partnership with a single client, known as a **fund of one**. A risk with SMAs or funds of one is that general partners, when allocating certain investment opportunities to investors, may favor limited partners who are paying the fund's standard fees.

Some open-ended mutual funds and “**undertakings for collective investment in transferable securities**” (UCITS) have developed to give smaller investors access to alternative investments. However, these structures are more regulated than the other investment vehicles and may constrain managers’ choice of strategies. As a result, returns on investments through these structures might not achieve the returns realized by the asset class as a whole.

Liquidity Concerns

Liquidity risk is one of the distinguishing characteristics of alternative investments. Both the investment structures and the underlying investments themselves contribute to liquidity risk.

Limited partnerships for alternative investments are typically structured with subscription provisions for accepting capital, lock-up periods, and restrictions on redemptions. Hedge funds, for example, may accept new capital quarterly or monthly, impose lock-up periods (often six months or a year) during which limited partners may not make redemptions or may do so only with a penalty, and offer redemptions on a quarterly or annual schedule as well as requiring a notice period prior to redemptions. They may also impose “gates” or maximum amounts that can be redeemed at any one time.

For funds in the private equity, private credit, real estate, and real asset sectors, liquidity provisions are often more strict than is typical for hedge funds. Subscriptions are structured in “closes” for new investors, usually over a one-year period. Limited partners commit a stated amount of capital, and the general partner will “call” this capital over an investment period (such as 3 to 5 years) as they identify investment opportunities. Redemptions are typically not available. Instead, the fund will distribute capital over its life (often 10 to 12 years) as it exits its investments. A small secondary market exists for limited partnerships, but transactions often take place at significant discounts to funds’ net asset values and may require approval from the general partner.

Figure 8.3 illustrates a time line of cash flows that might occur for a \$10 million commitment to a private equity fund.

Figure 8.3: \$10 Million Capital Commitment to a Hypothetical Private Equity Fund



Note in the figure that only \$9 million of the limited partner’s capital was called. A general partner is not required to call the full amount of committed capital. This is an

important consideration when estimating expected returns on a portfolio allocation to alternative investments. A fund may achieve an impressive rate of return, but a limited partner is only earning that return on the portion of committed capital that has been called.

Neither **capital calls** nor distributions occur on a predetermined schedule. Capital may be called (or not) at any time during the **calldown period**. Distributions can occur at any point in the fund's life, even during the calldown period. This, too, affects how much of a portfolio's allocation to alternative investments is actually invested at any point in time.

Limited partners must also consider the opportunity cost of their committed capital during the calldown period. Investing this capital in cash equivalents reduces returns. On the other hand, investing it in higher return but less liquid investments risks missing a capital call. Penalties for doing so can be severe, such as forfeiting all capital invested in the fund to date.

With respect to the liquidity of a fund's holdings, a potential issue is whether they are consistent with the fund's redemption terms. This is mostly a consideration for hedge funds; as noted previously, other types of private investment funds generally do not offer redemptions.

Hedge funds that pursue long-only equity strategies tend to hold relatively liquid investments that are consistent with offering redemptions monthly or quarterly. Short positions are less liquid, which can be a concern if funds that hold significant short positions also offer redemptions frequently. Investors should also note that general partners might designate some of a fund's less liquid holdings as not subject to the fund's ordinary redemption terms. This is referred to as a "**side pocket**." A fund's redemption terms may be misleading if a large portion of its holdings are side pocketed.

Frequent redemption periods may limit a general partner's flexibility to implement strategies with long time horizons or infrequent investment opportunities, such as event-driven strategies. This is particularly true for distressed assets and is the reason funds specializing in those tend to be private equity partnerships rather than hedge funds.

Funds that hold significant portions of illiquid investments, such as some relative value funds, may restrict redemptions under certain market conditions to avoid having to liquidate these assets during crisis periods. One effect of these restrictions is that during such periods, investors may demand redemptions from other hedge funds that have more liquid holdings.

Leverage is another important liquidity consideration because creditors have priority of claims over limited partners. Margin calls may force a leveraged fund to sell its most liquid holdings and be left with its less liquid investments, regardless of which holdings the general partner would otherwise prefer to keep.

Expenses, Fees, and Taxes

Many alternative investments involve significant fees and expenses, such as the "2 and 20" fee structure of many hedge funds (annual management fee 2% of assets under

management, incentive fee 20% of gains). Administrative expenses of a fund may also be passed through to investors.

Funds with calldown structures charge management fees on the amount of committed capital, regardless of how much of it has been called down. This may generate negative returns in the early years of an investment when much of the committed capital is yet to be called.

Investors must ensure that their investments, and the investment vehicles used to invest, are consistent with their tax situations. Some fund strategies may result in short-term taxable income to investors, or may be subject to tax withholding. Investors who need to estimate their annual income for tax reporting may find it difficult to do so given the unpredictable nature of returns from many alternative investments. Tax-exempt organizations must ensure that income from a fund will not be considered to be unrelated to the organization's purpose, and therefore considered taxable.

Intermediaries or In-House Programs

Large investors may consider developing their own program for implementing alternative investments directly rather than using intermediaries such as funds of funds. An in-house program may be appropriate for an investor that needs highly customized solutions, desires close control over its investment program, or wishes to implement co-investments with general partners. The "build or buy" decision depends on whether the investor can produce similar results to those of an intermediary at lower cost or generate returns high enough to offset any costs in excess of the costs charged by an intermediary.

A successful program must be able to identify and invest with the best fund managers. Even if an investor is expert at choosing managers who will generate top returns, those managers may attract more capital than they can invest productively, and therefore close their funds to new investors. Managers may also decline capital from investors whose public reporting requirements they feel would be inconsistent with their proprietary strategies.

Investors must also be able to perform due diligence on managers with whom they wish to invest. This requires access to their key decision makers, both before and during the life of an investment. Without this level of access, an investor may be left in a troubled fund when better-informed investors have already demanded redemptions.



MODULE QUIZ 8.2

1. A limited partnership structure with a single client is known as:
 - A. UCITS.
 - B. a fund of one.
 - C. a separately managed account.
2. Cash flows from investors into a private equity limited partnership:
 - A. are at the discretion of the general partner.
 - B. will be 100% invested after three to five years.

- C. are made only on the establishment date of the partnership.
3. Which of the following terms describes the practice of a hedge fund designating certain of its investment holdings as exempt from the fund's ordinary redemption terms?
- A. Gate.
 - B. Lock-up.
 - C. Side pocket.

MODULE 8.3: SUITABILITY, APPROACHES, LIQUIDITY, AND MONITORING IN ALLOCATING TO ALTERNATIVE INVESTMENTS



Video covering this content is available online.

LOS 8.e: Discuss suitability considerations in allocating to alternative investments.

In general, alternative investments are only suitable for large investors who have or can hire the specialized knowledge necessary to select profitable investments in this asset class. Because of the wide variety and complexity of alternative investment strategies that managers pursue, an investor needs a high level of expertise to understand the risks being undertaken and the market factors that drive the success of various fund strategies.

Alternative investment strategies are largely based on the premise that skilled managers can create value through active management. For this reason, alternative investments may not be suitable for investors whose philosophy is grounded in a belief in the price-efficiency of markets.

Time (investment) horizon is a key consideration in determining the suitability of alternative investments. Private equity and private real assets are generally suitable only for investors with long time horizons (15 years or more). For investors with shorter time horizons, hedge funds with short lock-up periods and strategies that can be exited relatively quickly may be suitable. Hedge funds that focus on liquid instruments such as publicly traded equities or commodity futures are examples.

A successful alternative investments program requires that the investor has a strong governance program. The investor should have a formal investment policy with clear objectives, put decision-making power in the hands of experts, and have a reliable reporting framework.

Investors in alternative investments must be comfortable with a lower level of transparency than is generally available with traditional investments. As private partnerships, the funds are not governed by the reporting requirements that apply to publicly traded companies. When they do issue reports to investors, the level of detail varies widely and reports often arrive with a significant time lag. Many hedge funds use independent administrators to calculate their net asset values, but private equity and private real asset funds typically do not, which gives them wider discretion in asset valuation. Furthermore, private equity and private real assets may be viewed as “blind

pools” in that a fund does not begin acquiring assets until investors have already committed capital to the fund.

LOS 8.f: Discuss approaches to asset allocation to alternative investments.

A suggested approach to including alternative investments in an asset allocation decision is to do it in two stages, first with only the traditional asset classes and then also considering alternative investments. The process can be assisted by statistical tools such as:

- Monte Carlo simulation.
- Mean-variance optimization.
- Risk factor based optimization.

These approaches can be used individually or in combination. Regardless of the approach chosen, an investor must consider the statistical properties of alternative investment returns that distinguish them from traditional asset classes.

Modeling the risk and return properties of alternative investments is challenging. Because asset valuations for many alternative investments are based on appraisals, returns data are likely to be artificially smoothed and are often stale. As a result, using these data without adjustment would underestimate risk. Testing returns data for serial correlation is a suggested method for detecting this smoothing effect. If serial correlation is present, statistical techniques exist that can be used to unsmooth the data.

The distribution of returns is also known to be non-normal, exhibiting skew and excess kurtosis to a greater extent than traditional asset classes. Here, too, the data can be adjusted with statistical methods (such as stochastic volatility, regime switching, or extreme value theory) or by using observed returns instead of an assumed normal distribution of returns. A further limitation is the relatively short history of alternative investments, which may result in small-sample and time-period biases.

One method for modeling a distribution with fat tails (positive excess kurtosis) is to define risk and return properties for two or more distinct market environments, for example, a normal period and a high-volatility period. Returns for each of these can be described with a normal distribution with its own assumed mean and variance. Combining the distributions, using an assumed probability of each environment occurring, results in a non-normal distribution.

Monte Carlo simulation has been described elsewhere in the CFA curriculum. Its use with respect to optimizing an asset allocation can be summarized as follows:

1. Decide between asset class returns or risk factors as the variables to be simulated.
2. Define how the model should behave statistically, for example by accounting for properties like mean reversion, fat-tailed distributions, or unstable correlations.
3. If the model is based on risk factors, translate them to asset class returns.

4. Use the resulting asset class return scenarios to develop meaningful outputs, such as the probability of a shortfall to a portfolio's required or target rate of return.

We introduced **mean-variance optimization** in an earlier topic review and described its use with traditional asset classes. When using this technique with alternative investments, the results may produce an excessive allocation to this asset class, particularly to illiquid investments such as private equity, especially when the data are not properly adjusted for smoothed returns. An optimization model may be designed to constrain the allocation to alternative investments (or any asset class) to be within a minimum and maximum percentage, or to limit overall volatility or downside risk.

Investors should consider the asset allocations suggested by an optimization model to be a guideline rather than a prescription. They must consider the allocation in the context of their objectives and constraints, such as their liquidity requirements. They must also be aware of the limitations of mean-variance optimization. For example, small changes in the inputs may generate significant changes in optimal asset allocations.

Risk factor based optimization is similar to MVO, but instead of modeling asset classes by their return and risk characteristics, the investor models risk factors and factor return expectations. Exposures to risk factors are optimized with respect to an overall risk budget. As with mean-variance optimization, constraints can be included in the model. In this case, the constraints are limits on specific risk factor exposures.

A risk factor based approach requires the additional step of translating the optimized risk exposures into an asset allocation. For example, both public and private equity provide exposure to economic growth risk, but the allocation to each depends on the desired exposure to liquidity risk.

One of the limitations of this approach is that asset classes' return sensitivity to some risk factor exposures might not be stable over time. Another is that correlations among risk factors may behave like correlations among asset class returns and increase during periods of financial stress.



PROFESSOR'S NOTE

The curriculum reading provides extended examples of these portfolio optimization techniques. While we do not believe the authors' empirical results are required by the Level III LOS, reviewing these examples can provide useful insights into how the techniques may be applied to asset allocation in practice.

LOS 8.g: Discuss the importance of liquidity planning in allocating to alternative investments.

Managing liquidity is a crucial aspect of an alternative investments program, especially one that includes private investments with near-term capital calldown periods and long investment horizons. A portfolio must be managed in a way that meets its capital commitments while still providing required liquidity.

An investor can develop forecasting models to help manage liquidity. Examples of liquidity modeling include projecting cash flows to and from a fund and forecasting the annual capital commitments needed to reach and maintain the targeted allocation to alternative investments.

Cash flows for a typical private investment partnership are capital calls in the early years and distributions in the later years. An investor can make assumptions about how a fund will call its committed capital. A simple model might assign a percentage of remaining capital to each year of the calldown period. In this model the capital contribution in period t would be the following:

$$\text{percentage to be called in Period } t \times (\text{committed capital} - \text{capital previously called})$$

Distributions from a fund can be modeled as percentages of its net asset value. The NAV increases with capital calls and investment returns, and decreases with distributions. To estimate distributions, an investor can assume an expected growth rate for the fund (that is, the IRR of its investments) and a percentage of NAV to be distributed in each period. Thus distributions in Period t would be the following:

$$\text{percentage to be distributed in Period } t \times [\text{NAV in Period } t - 1 \times (1 + \text{growth rate})]$$

and the NAV in Period t would be the following:

$$\text{NAV in Period } t - 1 \times (1 + \text{growth rate})$$

$$+ \text{contributions in Period } t$$

$$- \text{distributions in Period } t$$

Using models such as these, an investor can estimate the cash flows to and from a fund. The investor should understand a model's sensitivity to changes in model assumptions and how these affect cash flow forecasts.

Liquidity forecasting is also important for managing how a portfolio reaches and maintains its target asset allocations. Take for example a \$15 billion portfolio that currently has no investments in private equity but wants to have a 10% allocation to that asset class. This is unlikely to be achievable all at once (and even if it could be, the private equity investments would not be diversified across vintage years as they should).

Instead, the allocation to private equity will need to increase toward its 10% target over a number of years. Importantly, that percentage will be based on the future values of both the overall portfolio and the private equity investments. Thus, reaching and maintaining the target allocation requires estimating these values.

Combined with the cash flow forecasting approach described previously for a particular fund, an investor can project the capital commitments needed over a span of years to reach the target allocation, and forecast the need to reinvest future distributions to maintain the target.

A crucial aspect of liquidity planning is having cash available to meet capital calls. Keeping these amounts in cash equivalents has significant opportunity costs. A suggested approach is to invest it in publicly traded securities that may be viewed as

proxies for the private investments to which they are committed. For example, capital committed to private real estate but not yet called could be invested in publicly traded real estate investment trusts.

Capital calls, distributions, growth rates, and even fund lifetimes may turn out significantly different than expected. An investor should stress-test liquidity planning models against unexpected events such as delayed fund distributions when expected distributions have been earmarked to meet capital calls.

LOS 8.h: Discuss considerations in monitoring alternative investment programs.

An alternative investment program must be monitored to ensure that it is achieving its stated goals in terms of return, risk, income, and safety. Its performance should be evaluated in the context of these goals, rather than simply measured against a benchmark.

Even during the period when the allocation to alternative investments is building up to its target, monitoring is necessary to ensure the investments being made are consistent with the objectives of the program. Effective monitoring is particularly important with private and illiquid investments because these require considerable time to correct if they are out of line with the portfolio's objectives, or if the objectives have changed.

One reason that measuring against a benchmark or peer group can be misleading is the difficulty of selecting a representative one. Because many alternative investment strategies depend heavily on active management, any benchmark chosen is unlikely to be directly comparable to a portfolio's actual investments in the asset class. In addition, published indexes are often inconsistent with each other in the way they define various alternative investment strategies.

Monitoring of alternative investments can be challenging because their performance reporting can be infrequent and come with significant time lags. A further complication with private investments is that they often report internal rates of return rather than time-weighted rates of return. IRR is influenced by the timing of capital calls and distributions, and therefore, may be subject to manipulation. Investors may prefer to monitor a private fund's **multiple on invested capital (MOIC)**. MOIC is calculated by dividing the value of the fund's underlying investments, plus distributions, by total invested capital. Regardless of the metric used, investors should understand how any measure is affected by issues such as stale pricing and appraisal-based valuations. Understanding a fund's investment holdings qualitatively may be the best approach to judging whether a manager is adding value.

An investor should monitor these issues with respect to an alternative investment fund's management:

- A fund's "key persons" are typically specified in its documents. Limited partners may be able to exercise certain rights if a key person leaves, and should understand the circumstances that caused the departure.

- The manager's interests should be aligned with the investor's interests. Potential conflicts may exist if the manager raises a new fund that invests in some of the same underlying holdings. If a manager withdraws capital that he had invested alongside the limited partners, they should learn the reasons.
- Because managers have a great deal of discretion over how they invest capital, investors should monitor a fund's holdings over time for signs of style drift.
- Monitoring a fund's risk management framework is important, especially for leveraged strategies.
- An investor should observe the profile of a fund's other investors and judge whether they are likely to remain committed for the long term. An unexpected increase in redemptions by other investors may be a warning sign. This could potentially put the fund in a position of having to sell its more attractive holdings to raise cash, leaving the remaining investors with less liquid or more poorly performing assets. A manager may also exercise "gates" that block further redemptions.
- A large or unexpected increase in new investors may make more capital available to a manager than he has attractive opportunities to use. If this leads the manager to pursue lesser opportunities, the performance of the fund as a whole may suffer.
- A fund should have reliable auditors, custodians, and other third-party service providers. If these relationships change, an investor should understand whether it is for a positive reason (e.g., the fund outgrows the capabilities of a service provider and needs a larger one) or otherwise (e.g., an auditor quits a relationship because of a manager's actions).



MODULE QUIZ 8.3

1. Which class of publicly traded securities is *most likely* to be affected by similar risk factors to those that affect private credit?
 - A. REITs.
 - B. Equity securities.
 - C. High yield bonds.
2. Alternative investments are *most likely* to be suitable for a portfolio investor that:
 - A. has a strong governance program and insists on transparency.
 - B. has a long time horizon and believes financial markets are efficient.
 - C. believes active management can generate excess risk-adjusted returns over time.
3. When using optimization approaches to determine an allocation to alternative investments, recommended practices *least likely* include:
 - A. using smoothed historical data as inputs.
 - B. modeling normal and high-volatility periods separately.
 - C. placing constraints on the allocations to various asset classes.
4. A \$20 billion endowment has decided to increase its allocations to private equity and private credit from 5% each to 10% each. The endowment will *most likely* need to:
 - A. forecast the timing of capital calls and hold enough capital in cash equivalents to meet them.
 - B. account for the expected growth rate of the portfolio when planning the capital commitment.

- C. identify suitable investment vehicles for \$100 million each of private equity and private credit.
- 5. Compared to an alternative investment partnership's reported internal rate of return, its multiple on invested capital is less affected by:
 - A. stale pricing.
 - B. timing of capital calls.
 - C. appraisal-based valuations.

KEY CONCEPTS

LOS 8.a

Allocating portfolio assets to alternative investments can improve the risk-adjusted return of a portfolio that includes only traditional asset classes. Private equity and private credit may be viewed primarily as return-enhancing portfolio investments. Real assets may be viewed as risk-reducing investments. Hedge funds may serve either function in a portfolio, depending on the strategies they pursue.

LOS 8.b

Whether bonds or alternative investments are better risk mitigators for an equity portfolio depends on the investor's time horizon. Over short horizons, return volatility is the predominant risk, and bond returns have a lower correlation with equity returns than do alternative investment returns. Over long horizons, the main risk is failing to achieve the target return, so alternative investments may be more suitable than bonds because of their higher expected returns.

LOS 8.c

Traditional approaches to defining the investment opportunity set may be based on asset classes' liquidity or expected performance in different scenarios for economic growth and inflation.

A liquidity-based approach would distinguish among alternative investment classes that are publicly traded, such as REITs and commodity futures, and those that are not publicly traded, such as private equity.

An approach based on expected performance would distinguish alternative investment classes that are expected to outperform in a high-growth economy, such as private equity, from those that would be expected to provide an inflation hedge, such as indexed bonds or real assets.

A risk factor based approach to defining asset classes involves statistically estimating their sensitivities to risk factors. Its advantages compared to traditional approaches are that it can identify sources of risk that are common to different asset classes (such as public and private equity) and allow a manager to analyze multiple dimensions of portfolio risk. Its limitations are that it can be difficult to communicate to decision makers and implement, and that its results may be sensitive to the historical period used in the analysis.

In addition to risk, return, and correlation, important considerations for alternative investments include investment vehicles, liquidity, expenses and fees, taxes, and the need to obtain special understanding of the asset class.

Alternative investment funds are typically structured as limited partnerships, with the manager as general partner and investors as limited partners. Investors that are not large enough to invest directly in limited partnerships often invest in funds of funds to gain exposure to alternative investments.

Liquidity concerns include lock-up periods, redemption restrictions, the opportunity cost of committed capital, and the practice of “side pocketing” to exempt some assets from a hedge fund’s redemption terms.

Alternative investment funds charge management fees and incentive fees. Management fees are based on committed capital rather than called capital. Investors must ensure that a fund’s activities and distributions are consistent with their tax situations.

When deciding whether to invest through funds of funds or develop an in-house program, investors should consider the expense of developing and maintaining a program, their needs for customized solutions and close control, and whether they intend to make co-investments with general partners.

LOS 8.e

Alternative investments are suitable for large investors with long time horizons, the specialized knowledge to succeed in this asset class, strong governance frameworks, comfort with a lack of transparency, and a belief that active management can create value.

LOS 8.f

Asset allocation approaches such as Monte Carlo simulation, mean-variance optimization, and risk factor based optimization can be extended to include alternative investments. However, investors must take care to adjust the data for this asset class for smoothed returns that underestimate risk, and to include constraints in their asset allocation models. Otherwise these techniques are likely to over-allocate to alternative investments.

LOS 8.g

Liquidity planning for alternative investments must be managed such that the investor meets its capital commitments. An investor can develop forecasting models to project cash flows to and from a fund and forecast the capital commitments needed to reach and maintain the targeted allocation to alternative investments. These models should be tested for sensitivity to their assumptions about the timing of capital calls, distributions, growth rates, and lifetimes of the funds.

LOS 8.h

An alternative investment program must be monitored to ensure that it is achieving its stated goals. Its performance should be evaluated in the context of these goals, rather than measured against a benchmark. An appropriate benchmark is difficult to establish

for an alternative investments program because its performance depends greatly on active management by the managers chosen.

Investors in private funds may choose *multiple on invested capital* as a metric to monitor, rather than the internal rates of return reported by the funds.

Investors should monitor an alternative investment fund's key persons, risk management framework, and third-party service providers, as well as the profile of the fund's other investors. They should be alert for signs of style drift or misalignment of a manager's interests with investors' interests.

ANSWER KEY FOR MODULE QUIZZES

Module Quiz 8.1

1. **C** Alternative investments that can diversify a public equity portfolio include commercial real estate, real assets, and hedge funds that pursue non-equity-oriented strategies. Private equity, distressed debt, and equity-oriented hedge funds are less appropriate because they are affected by many of the same risk factors as public equity. (LOS 8.a)
2. **C** Smoothing of returns and sampling biases are believed to understate the correlation of alternative investments with traditional asset classes and therefore overstate their diversification benefits. These data issues are believed to understate risk measures. Their effect on reported returns is not clear. (LOS 8.b)

Module Quiz 8.2

1. **B** A fund of one is a limited partnership structure that has only a single client. (LOS 8.d)
2. **A** Typically, in private equity limited partnerships, the limited partners commit a fixed amount of capital, which the general partner can call over a number of years as investment opportunities arise. Limited partners are responsible for having cash available to meet capital calls. General partners may call less than 100% of the committed capital. (LOS 8.d)
3. **C** Assets that are not subject to a fund's redemption terms are said to be held in a side pocket. A gate is a maximum amount an investor may redeem at one time. A lock-up is a restriction on redemptions during a period of time. (LOS 8.d)

Module Quiz 8.3

1. **C** High yield debt may be viewed as a proxy for private debt because they tend to be affected by the same risk factors. (LOS 8.c, 8.g)
2. **C** Allocating to alternative investments is most suitable for investors with long time horizons, strong governance programs, comfort with limited transparency, and a belief that active managers add value. (LOS 8.e)

3. **A** Because some alternative investments have relatively short histories of returns data, use of historical data alone may introduce time-period and small-sample biases. Unsmoothing is recommended because the data often reflect appraisal-based valuations. (LOS 8.f)
4. **B** To achieve a target allocation to alternative investments, an investor needs to account for the expected growth rate of the portfolio. Because the target will likely only be reached a number of years in the future, the commitment to the asset class will be larger than the target allocation as a percentage of today's portfolio value. Immediately investing the targeted percentage, even if enough suitable investments can be found, would lack diversification across vintage years. To reduce the opportunity cost of committed capital, cash that needs to be available if called can be invested in liquid public securities that have similar risk characteristics as their intended private investments. (LOS 8.g)
5. **B** Multiple on invested capital is less subject to manipulation of cash flow timing by a manager than IRR, but may still reflect stale pricing and appraisal-based valuations. (LOS 8.h)

READING 9

AN OVERVIEW OF PRIVATE WEALTH MANAGEMENT

EXAM FOCUS

This reading considers how wealth is measured for individuals, then moves on to look at how global changes have affected the levels of wealth and how that wealth is distributed. The curriculum contains great detail regarding recent economic history in various parts of the world. We reproduce some of the key points here, but candidates should focus on the main drivers of change globally and the trends that have had major impacts on world economic growth.

In addition, we introduce the concept of human capital and understand how it changes over the seven financial stages of an individual's life. Focus on how the changing mix of human and financial capital influences the financial choices made by an individual and their wealth advisor.

This reading continues with a discussion of how both tax and inflation erode the value of investments. We start by looking at how the taxation of investment returns fits into the overall tax system for individuals. Then, we consider how different sources of income attract tax at different rates and at different times. Candidates should focus on the effect on the final value of the investment, which will then be further impacted by inflation. The aim is to understand what the future investment value will be in *after-tax, real terms* (i.e., the actual purchasing power).

MODULE 9.1: WEALTH ACROSS THE WORLD



Video covering this content is available online.

LOS 9.a: Discuss the different types of individual wealth and how wealth is created and distributed globally.

Individual Wealth

For this module, candidates should focus on understanding what is meant by *individual wealth*. A few key definitions are useful at this stage.

Figure 9.1: Key Wealth Definitions

Type of Wealth	Description and Examples
Aggregate wealth	This is the total value of all assets owned, including personal property, financial assets, real assets, productive assets, and rights. This an asset-only measure (i.e., stated before subtracting liabilities).
Net worth	This is the difference between assets and liabilities with values that are relatively easy to measure. This includes publicly traded securities, real estate, and debts, but excludes complex intangible assets like copyrights.
Financial wealth	These are all financial assets (e.g., mutual funds, stocks, bonds, hedge fund holdings). Financial wealth may also include accrued pension rights (i.e., future pension receipts earned by past years of work). Stakes in family businesses are excluded because these are classified as <i>productive assets</i> (see next).
Real wealth	These are tangible assets including real estate and commodities, but not including personal property or financial assets. An individual's primary residence may be the biggest element of this category.
Personal property	This typically comprises cars, clothes, furniture, and so on. These assets are not expected to appreciate and may be worth more to the holder than their fair market value.
Productive wealth	These are assets used to generate wealth through production and business operations (e.g., a direct shareholding in a family business).
Liquid wealth	These are assets that can be easily converted to cash, such as publicly traded securities. This is a subset of the assets referenced previously.
Investable wealth	These are financial and other assets that are readily available for investment, usually a subset of financial wealth. This wealth is the main focus of private wealth management.
Economic net worth	This expands net worth to include pension benefits and human capital within assets, as well as the PV of future consumption and bequests as liabilities. Human capital is the PV of an individual's future earnings.

Global Wealth Creation

Since World War II, the global economic landscape has fundamentally changed. Technological breakthroughs and international trade have accelerated economic growth and led to a substantial rise in global wealth as measured by GDP per capita. Examples of factors that have driven growth include the following:

- Market-oriented economic policies and increased international competition, such as the fall of the Berlin Wall in 1989 that opened Germany and Eastern Europe to trade with the rest of the world
- The shift toward free-market capitalism, as seen in the privatization of industries in many countries where previously state-owned assets such as telecoms and airlines we transferred to public ownership and exposed to competition
- Reductions in regulatory barriers and increased access to funding, including access to investments in commodities and real estate
- Increased global communication and connectivity

- Rise in entrepreneurship seen globally since the 1980s, leading to job creation and innovation
- Asset price appreciation, especially in the United States and other developed markets
 - Global stock market capitalization and global GDP both grew at annual rates of about 7% between 1970 and 2021, and show high positive correlation

Not all apparent increases in individuals' wealth represent an increase in overall wealth. For example, gambling wins and inheritances, although significant, do not increase net wealth for the country overall. Rather, they represent a transfer of wealth within the country.

Overall, entrepreneurship and asset price appreciation remain the primary sources of wealth creation in most economies. Although wealth may be increasing overall, not everyone benefits. Inequality in income and wealth is often a persistent factor and is discussed in more detail later in this reading.

Local Factors

North America

The main driver of wealth is growth from business formation and entrepreneurship. Steady increases in productivity and increases in financial asset values (i.e., stock markets rising) have also contributed to increased wealth levels. Distribution is uneven, more significantly benefitting professionals and executives in companies who have been rewarded with equity, as well as entrepreneurs who have built and sold their businesses.

Europe

Together, Europe and North America account for close to 57% of total global wealth. Wealth creation has been similar in Europe to North America, being driven by economic growth. However, in Europe, more wealth is in privately held family businesses and inherited real estate.

In Eastern Europe, significant structural economic change followed the fall of the Soviet Union and the subsequent move to market-based economies. These countries benefitted from the inflow of investment from overseas and increased investment in technology and education, raising living standards significantly from the previous centrally planned regimes. In some formerly communist countries with important natural resources (oil and minerals), wealth creation mainly benefitted a group of politically well-connected individuals known as oligarchs.

Asia-Pacific

This region has seen a significant increase in wealth as it has moved from being an agrarian economy to being an international manufacturing base and a provider of services. For example, Japan has created a highly skilled and technologically advanced manufacturing sector with a focus on exports. Many countries in the region have invested heavily in education and training and have globally competitive workforces,

coupled with high levels of entrepreneurship. Significant inward financial investment has also benefitted these economies.

Latin America

While this region has benefitted from economic modernization, persistent wealth and income inequalities remain. Sustained economic growth and political stability have been elusive in many Latin American nations. For example, in Argentina, periods of hyperinflation have resulted in the currency (ARS) devaluing against the USD, falling from near parity to the dollar in 2012 to 175 ARS to the dollar in 2022, dramatically decreasing living standards and the ability to import goods.

Middle East

Significant wealth has been created from the export of petroleum, but this wealth can be extremely concentrated among those families who have inherited their wealth over generations. Some countries, such as Saudi Arabia with 40% of GDP arising from oil-related revenue, are actively trying to diversify away from oil dependence to protect the long-term wealth of the economy and reduce the fluctuations caused by swings in oil prices.

Africa

This region has seen an increase in wealth and living standards, with strong revenues from commodities, high levels of inward foreign investment, and some well-performing local economies. However, inequality is high, with wealth highly concentrated among the ruling elite, executives, and professionals.

Distribution and Inequalities

A few statistics illustrate the inequalities seen in the distribution of global wealth, all taken from the Credit Suisse Global Wealth Databook 2022:

- 53% of the global adult population had wealth below USD 10,000; 1% of adults had wealth exceeding USD 1 million.
- The median global wealth is USD 8,360, while the mean global wealth is USD 87,489. This positive skew means a small number of extremely wealthy individuals pull up the mean, but the middle ranking person (median) has a far lower level of wealth, so the mean is not representative of the population as a whole.
- The bottom 50% of adults controlled less than 1% of global wealth.
- The richest decile (i.e., the top 10% of adults by wealth) controlled 82% of wealth.

These facts are eye-catching, but we need a mathematically consistent way to describe inequality, and this is known as the Gini coefficient.

Gini Coefficient: 0	Gini Coefficient: Between 0 and 1	Gini Coefficient: 1
Perfectly uniform wealth distribution	As the coefficient rises, so does the inequality, or concentration of wealth	Maximum income inequality
Each 10% of the population controls 10% of the wealth	Higher coefficient linked to higher skew in wealth distribution (i.e., the lower-decile households control much less of the cumulative wealth and the top deciles control more)	Wealth is concentrated in the hands of very few individuals
All adults are equally wealthy so no status reflected through wealth levels. Mean wealth = median wealth		Mean significantly exceeds the median wealth



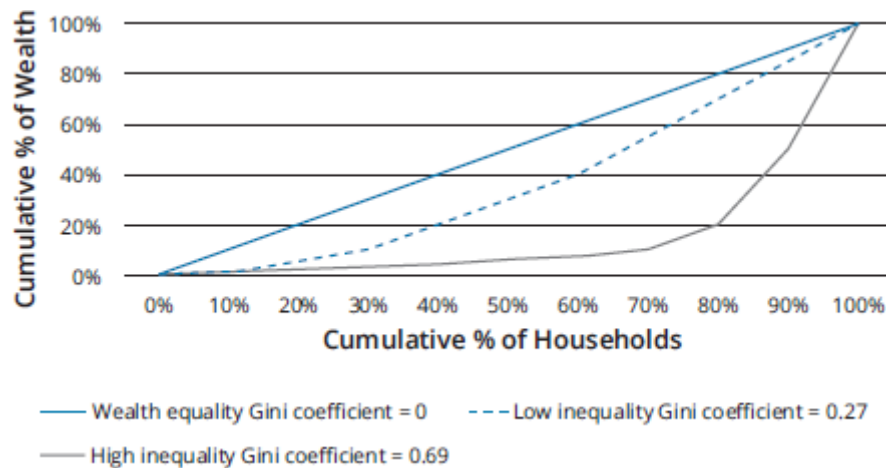
PROFESSOR'S NOTE

There is no requirement to calculate the Gini coefficient, but it may help to see a graphical illustration of how the area under a cumulative wealth distribution curve (known as a Lorenz curve) translates to the values just described.

Figure 9.2: Gini Coefficients¹

Cumulative % of Households	Cumulative % of Wealth		
	Wealth Equality Gini Coefficient = 0	Low Inequality Gini Coefficient = 0.27	High Inequality Gini Coefficient = 0.69
0%	0%	0%	0%
10%	10%	1%	1%
20%	20%	5%	2%
30%	30%	10%	3%
40%	40%	20%	4%
50%	50%	30%	6%
60%	60%	40%	7%
70%	70%	55%	10%
80%	80%	70%	20%
90%	90%	85%	50%
100%	100%	100%	100%

Figure 9.3: Gini Coefficient and Wealth Distribution²



Global trends seem to indicate wealth inequality increasing in both developed and developing countries. This effect is more pronounced in developing countries due to greater income variability and fewer government safety nets (e.g., unemployment support). Inequality also rises during periods of recession or economic stress, such as the Global Financial Crisis or COVID-19.

Notable examples of countries with high income inequality include Russia and China, with Gini coefficients approaching 0.9 and 0.82, respectively.

Profiling and Serving Clients

At the top end of the distribution of wealth lie the HNW (high-net-worth) and UHNW (ultra-high-net-worth) clients. There is no precise cut off between these categories, but the complexity of clients' affairs increases with their wealth. A private wealth manager must be aware of the clients' legal, tax, and family factors as well as their financial situations.

Typically, the UHNW segment consists of those with wealth measured in tens of millions of USD, including the smaller subsets of centmillionaires (wealth in excess of USD 100 million) and billionaires. Often these clients use **family offices**, private firms that provide a suite of services including investment, tax, estate planning, and philanthropy management, tailored to the UHNW client and family's needs. The primary objective of a family office is to preserve and grow wealth across generations while being aware of the family's unique opportunities and challenges. These challenges may arise from exposure to various tax and legal jurisdictions. Beyond the family office are supporting professionals who may be called on to provide specific services such as succession planning and accountancy.

Differing tax approaches around the world may encourage HNW clients to move to a more favorable tax regime (known as tax havens). This needs to be balanced with the ethical view that the wealthy should contribute to society through the payment of taxes. As well as considering tax rules, any international move should consider political risk, i.e., the risk of changes in regulations, legal frameworks, and the general rule of law that may deteriorate if a country is going through an unstable period.

MODULE QUIZ 9.1

1. Which of the following statements regarding wealth measures is *most accurate*?
 - A. Vested benefits in a defined benefit pension scheme are not included in an individual's aggregate wealth.
 - B. A savings account and tax-advantaged investment account are both included in the category of investable assets.
 - C. Investments in listed equity, unlisted equity, and shares in family business are included in the category of financial assets.
2. Which of the following is *most likely* a factor that decreases economic growth and wealth in the long term?
 - A. State ownership of major industries.
 - B. Increased Inflows of direct foreign investment.
 - C. Increased competition arising from international trade.
3. Which of the following statements regarding major regional economic trends is *least accurate*?
 - A. In Europe a greater proportion of wealth is in privately held family business than in North America.
 - B. The Asia-Pacific region has a high level of concentration of wealth from natural resources in the hands of oligarchs.
 - C. Latin American countries have experienced an overall rise in wealth, but many countries have experienced political instability and increasing inequality.
4. Which of the following *most likely* represents the creation of new wealth?
 - A. Lottery wins.
 - B. Inheritances.
 - C. Sudden fame.
5. In a period of hyperinflation, a country would expect to see:
 - A. weakening of its currency and an increase in nominal GDP per capita in local currency terms.
 - B. strengthening of its currency and an increase in nominal GDP per capita in local currency terms.
 - C. weakening of its currency and a decrease in nominal GDP per capita in local currency terms.
6. A country's Gini coefficient moves from 0.5 to 0.6 over a period of time. Which of the following is *most likely* to be a reason for this change?
 - A. The country has entered into a period of severe economic contraction.
 - B. The country has increased the taxation rates for the wealthiest households.
 - C. The government has invested heavily in social safety net policies, such as income support for unemployed workers.
7. A country with a Gini coefficient of 0.5 has a mean wealth that is:
 - A. less than the median wealth.
 - B. the same as the median wealth.
 - C. greater than the median wealth.

MODULE 9.2: LIFE-CYCLE VIEW OF HUMAN CAPITAL



Video covering this content is available online.

LOS 9.b: Evaluate how changes in human capital, financial capital, and economic net worth across the financial stages of an individual's life influence their financial decision making.

The Wealth Life Cycle

When thinking about an investor's goals, priorities, and constraints, a useful framework is the **seven financial stages of life**:

1. *Education.* This is the period before entering the workforce where an individual may be financially dependent on their parents and likely has little financial capital.
2. *Early career.* The individual enters the workforce, often starts a family, and then assumes other personal responsibilities, such as beginning to save and taking on debt to purchase a house.
3. *Career development.* Typically occurring during ages 35–50, the individual sees income growth and an increase in financial responsibility and outgoings, limiting their ability to save.
4. *Peak accumulation.* An individual reaches maximum earnings. Retirement planning and minimizing taxes can be a key focus.
5. *Preretirement.* This is the few years before planned retirement. This period may involve changing expectations around lifestyles to be commensurate with wealth.
6. *Early retirement.* This is the most active period of retirement. It may be important to continue to take some risk in portfolio choices to ensure asset growth.
7. *Late retirement.* This is a complex phase due to unknown duration, where the individual faces **longevity risk**—the risk of outliving their financial assets. Health care may be a concern.

The wealth of an individual changes throughout their lifetime, as does the underlying asset composition. A focus on financial assets overlooks a very important aspect of an individual's overall worth—their human capital.

Human Capital

Human capital is the present value of an individual's expected future employment income. It is an implied asset that is conceptually straightforward, but due to uncertainties around anyone's future employment trajectory, it is effectively impossible to value accurately. However, for the exam, you should understand the key inputs to estimating an individual's human capital:

- *Future income from employment.* This involves taking the current income level and applying an assumed growth rate, and assuming a certain number of years remaining of employment.

- *Probability of survival* for each future year of the calculation. This can be taken from actuarial tables, but while these work well for populations in aggregate, they may not reflect an individual's risk characteristics.
- *A nominal risk-free rate* as a basis for discounting.
- *A risk premium* to reflect uncertainty in the future income stream. This is added to the nominal risk-free rate to account for some professions having a greater volatility of earnings. For example, an investment banker's earnings should be discounted more heavily than a government worker's earnings.

With estimates in place for these inputs, the estimate of human capital is a PV of future income, weighted by the probability of survival for each year.

Holistic (Economic) Balance Sheet

An investor's net worth can be considered as a balance sheet of their assets and liabilities. This concept can be extended so that assets include an estimate of human capital. Liabilities are also extended to include the PV of future consumption and bequest goals.

EXAMPLE: Holistic balance sheet

(The items in bold italics are those not found on a traditional balance sheet.)

Assets (in thousands):		Liabilities (in thousands):	
Financial		Short-term debt	
Current assets	500	Home mortgage	500
Investment assets	1,500		
Non-marketable		<i>PV of future consumption</i>	<i>3,500</i>
Home	750		
DC plan balance	1,450		
<i>Private pension</i>	<i>40</i>	<i>Planned bequests</i>	<i>1,000</i>
<i>Government pension</i>	<i>450</i>		
Human			
<i>Future labor income</i>	<i>250</i>		
Total Assets	4,940	Total Liabilities	5,175

Based only on the traditional balance sheet, the assets of 4,200,000 well exceed explicit debts of 675,000, while the holistic balance sheet shows negative net worth of 235,000. This suggests consumption and bequest plans are unrealistic. However, it is generally more difficult to value the additional items on the economic balance sheet, and the negative net worth could be an estimation error. There could also be missing economic assets such as expected inheritance that need to be included. If net worth is actually negative, it indicates ultimate spending plans will eventually have to change. The relatively low amount of HC (not pension benefits) suggests the individual is near retirement.

For many individuals, total wealth (HC + FC) as well as FC will peak near retirement. Both will then be drawn down in retirement.

The composition of the balance sheet is likely to change over the individual's life cycle. HC is likely the dominant asset for younger individuals. Over time, HC will decline as remaining work life shortens. FC should increase as the individual saves and invests in FC. Net worth can be positive or negative based on the adequacy of savings versus projected needs. Early in the life cycle assets such as real estate and other tangible assets may dominate the balance sheet. Other FC is then likely to increase in the later stages of life as funds are saved and invested. In early retirement, pension benefits are the dominant asset for many. For wealthier individuals pension benefits may be relatively smaller and FC may be relatively larger.

Entrepreneurship vs. Human Capital

An **entrepreneur** gives up the stability of employment income for the potentially higher, but more volatile, cash flows from building a business. Unlike human capital, which diminishes as an individual approaches retirement, the value created from entrepreneurship can be turned into financial wealth as the business owner liquidates their stake in the business. Therefore, entrepreneurship adds to total wealth and offsets the decline in human capital.

Diversification

Human capital is risky in that its value is linked to the success of the individual in their chosen employment role—or in case of an entrepreneur, the success of their business. An investor should use pension and financial assets to diversify this risk exposure. Consider the cases of a government employee and an entrepreneur:

- A government employee has a stable salary, so they can afford to take risk in their financial investment portfolio. This will provide them with greater growth opportunities.
- An entrepreneur's income from their business is volatile and may be exposed to risks from their particular business sector. The investment portfolio should have a strong fixed income allocation and ideally include exposure to industries not strongly correlated with their business area, to balance out the risks from human capital. Of course, if a decision is made to invest in fixed-income securities, the returns will be lower, and this may put pressure on being able to meet financial objectives.

Pension assets may also be subject to risk. This may be of less of a concern to very wealthy individuals, but for those relying more on pensions, there is always the risk of private pensions failing and of government pensions not being able to deliver the promised benefits.



MODULE QUIZ 9.2

1. Which of the following statements is *least accurate* regarding the inputs to a human capital calculation?
 - A. The discount rate is the real risk-free rate plus a risk premium that accounts for the volatility in the earning stream.

- B. The probability of survival taken from actuarial tables will be different for each year of future income as the individual ages.
 - C. The risk premium and assumed income growth rate for a government-employed teacher will both be lower than those for an investment banker.
2. Which of the following is *least likely* an example of a liability on a holistic balance sheet?
- A. Human capital.
 - B. Planned bequests.
 - C. PV of future consumption.
3. Compared to an entrepreneur, a government employee should allocate:
- A. less of their financial assets to equities.
 - B. more of their financial assets to equities.
 - C. the same proportion of their financial assets to equities.

MODULE 9.3: INDIVIDUAL INVESTOR CONSIDERATIONS



Video covering this content is available online.

LOS 9.c: Justify how returns, risks, objectives, and constraints for individuals relate to their human and financial capital.

Returns

When considering an individual's needs, especially for individuals saving for retirement, it is important to think in terms of inflation-adjusted returns. Inflation erodes purchasing power, and this effect compounds over time. Therefore, rather than focusing purely on nominal returns, investment objectives need to include providing returns that outpace inflation. Asset classes such as equities, real estate, and commodities may be considered for this purpose, but it is important to distinguish between *outpacing inflation* and *hedging against inflation*.

Equities, over the long term, tend to provide returns that outpace inflation. However, equity prices can be quite volatile in the short term, and they might not outpace increasing or persistent inflation.

Commodities such as oil and gold can see their prices outperform during inflationary periods (indeed, commodity prices may contribute to increased inflation), so holding these assets may provide an inflation hedge in the short term. However, they do not always outperform persistent inflation—and at times, their prices can be quite volatile.

Inflation-linked bonds issued by governments keep pace with inflation, but they often offer low real returns. Most fixed-income bonds are not inflation linked.

Real estate can provide a hedge against inflation because property prices tend to rise over time along with the general price level, and rents may be pegged to inflation indices. However, there may be times when real estate prices stagnate or drop during inflationary times due to economic uncertainty.

Risks

Individuals face different types of risk:

- **Return volatility.** These are fluctuations in value and returns from an investment.
- **Drawdown risk.** This is the risk of an asset declining in value, specifically measured as the difference between the investment's peak value and lowest point during a time period. A drawdown is not a realized loss unless the investor is forced to liquidate the asset at this low point.
- **Not achieving the investor's financial objectives.** This could be due to market conditions or the investor not allocating enough capital to meet these objectives.

Return volatility and drawdown risk can be reduced through diversification across asset classes.

A private wealth manager needs to understand a client's risk tolerance to formulate an appropriate investment strategy for the client. A private client's risk orientation can be described in several ways:

- **Risk tolerance.** This reflects both the client's *willingness* and *ability* to take risks. The opposite of risk tolerance is *risk aversion*.
- **Risk capacity.** This addresses a private client's *ability* to take financial risks, based on the client's wealth, income, investment horizon, liquidity requirements, importance of goals, and other relevant considerations. The higher the risk capacity, the greater the ability of the client's portfolio to sustain losses without putting the client's goals in jeopardy. Generally, the ability to bear risk is decreased by the following:
 - A shorter time horizon
 - Large critical goals in relation to the size of the portfolio
 - Goals that are important to the client or those that cannot be deferred
 - High liquidity needs
 - Situations where the portfolio is the sole source of support, or there is an inability to tolerate losses in value
- **Risk perception.** This is defined as a subjective measure of investment risk. Risk perception varies from one private client to the next; a wealth manager can play a part in influencing a client's risk perception.

Private wealth managers can evaluate the risk tolerance of their clients using a combination of questionnaires and conversations. Conversations can yield additional information about a private client's risk tolerance (e.g., the client's past investment successes and failures; risk perception; and financial background and experiences) that may be difficult to obtain from questionnaires, as well as enabling the wealth manager to educate clients about investment risk.

Here is an example of a risk tolerance question:

When you make investment decisions, on which of the following do you tend to focus?

- A. Always on the potential for gain.
- B. Usually on the potential for gain.
- C. Always on the potential for loss.
- D. Usually on the potential for loss.

If a client's answer indicates a strong risk aversion (e.g., Answer C in this question), this would give an indication of the risk perception of the client.

When private clients have multiple financial goals, the wealth manager should determine the client's risk tolerance for each goal (e.g., a client may have a low risk tolerance for more important goals but higher risk tolerance for lower-priority goals).

Objectives and Constraints

Private wealth managers help their clients formulate and prioritize their financial goals. A private client's financial goals can be categorized into *planned goals* and *unplanned goals*.

Planned Goals

These are goals that can be *reasonably estimated* within a *specified time horizon*. Planned goals may include:

- Retirement goals (e.g., funding a comfortable existence post-retirement).
- Specific purchases (e.g., primary or secondary residence).
- Funding the education of dependents.
- Funding significant family events (e.g., wedding celebrations).
- Charitable giving.
- Wealth transfer during a private client's lifetime or at death.

Unplanned Goals

These goals are related to *unexpected financial expenditures*. Unplanned goals by their nature are more difficult to deal with because of the *uncertainty* associated with the *amount of expenditure* and/or *timing*. Examples of unplanned goals include unforeseen expenditures related to property repairs and unexpected medical expenses that are not covered by health insurance.

The Private Wealth Manager's Role in Formulating Client Goals

Private wealth managers can assist their clients in formulating their financial goals in the following ways:

- *Quantifying goals.* A private client may need assistance to formulate specific and realistic goals when these are difficult to quantify (e.g., funding a comfortable retirement).
- *Prioritizing goals.* When a private client has goals that are difficult to reconcile (e.g., purchasing a vacation property in retirement versus providing for the education of a client's dependents), the wealth manager can help the client identify the goals that have higher priority. Note that these may not necessarily be the ones that occur earlier in the client's time horizon.

- **Changing goals.** Private clients may decide to reevaluate their financial goals after a change in their financial circumstances. Wealth managers can assist clients in this process and in modifying their investment strategy.

EXAMPLE: Formulating client goals

Bonnie DuBois, a 60-year-old U.S. citizen, has just retired after a 35-year career in the fashion industry. Through a modest lifestyle, disciplined saving, and the help of a private wealth manager, she has accumulated a \$2,000,000 diversified portfolio.

DuBois resides in a house that has been paid off for several years. She estimates she will need \$60,000 per year, with annual increases for inflation, to fund her lifestyle in retirement. One of the benefits of DuBois's past employment is comprehensive health insurance in retirement, but she is concerned that she might need long-term care in the future.

In a recent conversation with her wealth manager, she mentions her desire to help support her son Barry, his wife Betty, and their three children (ages 14, 12, and 10). Barry's and Betty's combined salaries barely meet their living expenses currently as they hold relatively junior roles in their respective employment. DuBois expects to provide them with \$30,000 per year for the next five years and states that supporting her son and his family is the most important priority for her because of its proximity timewise.

She also wishes to purchase a vacation property in five years, although she is unsure how she will fund the purchase. She has informed Barry and her wealth manager that, at her death, her estate will be gifted to a local museum.

1. **Identify** DuBois's planned and unplanned goals.
2. **Discuss** how DuBois's private wealth manager can assist her with quantifying and prioritizing her financial goals.

Answer:

1. DuBois's *planned* goals are (1) funding her lifestyle in retirement, (2) supporting her son and his family for the next five years, (3) purchasing a vacation property in the Caribbean, and (4) gifting her estate to a local museum at her death.

Her *unplanned* goals are her long-term care costs if her health deteriorates in retirement and the property repairs that may be required for her house and the vacation property in the Caribbean if purchased.

2. DuBois has quantified the retirement funding goal and the support of her son and his family. She should work with her wealth manager to quantify her goal of purchasing a vacation property and to decide on the best way to fund the purchase. She and her wealth manager should also work to quantify her goal of gifting her estate to a local museum at her death.

DuBois states that supporting her son and his family is her most important priority. Note that the timing of a financial goal should not be the primary reason for determining the priority of goals. DuBois's wealth manager needs to help her determine which of her goals are most important. If DuBois's support for her son

and his family competes with her desire to purchase a vacation property and her ability to make a meaningful bequest to a local museum at her death, she should consider reevaluating her priorities.



MODULE QUIZ 9.3

1. Which of the following statements regarding inflation protection is *most accurate*?
 - A. Fixed-income securities suffer from inflation in the short run and long run.
 - B. Equities provide both a long-term, above-inflation return and a short-term inflation hedge.
 - C. Inflation-linked bonds protect the investment against loss of purchasing power in the long run but not in the short run.
2. A risk questionnaire is *most* useful to help understand a private client's risk:
 - A. capacity only.
 - B. perception only.
 - C. capacity and risk perception.

MODULE 9.4: IMPACT OF TAXATION OF INFLATION



Video covering this content is available online.

LOS 9.d: Evaluate how various types of taxes imposed on individual investors and the impact of inflation influence investment decisions.



PROFESSOR'S NOTE

The calculations are relatively straightforward. Focus on the logic of what is happening to the investments. The formulas presented in this reading are necessary, but they are not always the best way of actually approaching the calculations. Nothing here goes beyond a basic application of growth or discounting—and at this stage in your studies, you should have the confidence to give the numbers a go.

Taxation of Investment Returns

Investment income is usually treated by tax authorities as a separate source of income to an individual's employment income. An individual country will decide on its own tax rules, but in general, investment returns are treated either the same or more favorably than employment income:

- **Interest income** is usually taxed in the year it is received. Some jurisdictions exclude some interest income from taxation or apply favorably rates.
- **Dividend income** is usually taxed in the year it is received. Many jurisdictions tax dividends favorably on the basis that the company paying the dividends has already paid tax on its profits.
- **Capital gains** tax is usually levied on *realized* capital gains (i.e., the asset must be sold or transferred to trigger a tax liability). The tax rate may vary according to the type of asset or the length of ownership. Generally, longer-term gains are taxed

favorably, reflecting the government's desire to encourage longer-term investment to benefit the economy and encourage saving.

- **Wealth taxes** are used in some systems to levy an annual tax on wealth. However, these are relatively unusual and will not be included in the discussion or calculations in this module.

Most countries adopt **progressive tax systems**, whereby the tax rate increases with income levels. The rates are applied to each slice of income separately, to build up the total tax liability. Investment income is usually treated as sitting on top of any employment income, as the next examples illustrate.



PROFESSOR'S NOTE

The following Stella Baghurst example illustrates the approach to progressive taxes used in Switzerland. You should be aware that jurisdictions vary in their approach to progressive taxes. We recommend working through this example as the approach may differ from the approach used in your home jurisdiction.

EXAMPLE: Progressive tax rates

Stella Baghurst resides in a country with a progressive tax rate structure, as shown in the following table:

Taxable Income Over (EUR)	Up To	Tax on Column 1	Percentage on Excess Over Column 1
0	10,000	—	10%
10,000	40,000	1,000	20%
40,000	100,000	8,000	30%
100,000	500,000	30,000	40%
500,000	—	200,000	50%

Calculate the amount of tax that Baghurst owes and determine her average and marginal tax rates.

Answer:

Income within each band is taxed at that band's rate. As a shortcut, we can use the numbers in Column 3 to show the cumulative tax paid up to the start of that tax band.

If Baghurst's taxable income is EUR 600,000, she would pay this tax:

$$500,000 \times 40\% + 100,000 \times 50\% = \text{EUR } 250,000$$

This equates to an **average tax rate** of $250,000 / 600,000 = 41.67\%$.

The third column in the table can save time by giving you the total tax up to the start of the band that the individual's income falls in. In Baghurst's case, the tax up to the start of the 500,000 band is already 200,000, and to this, we add the tax in the top tax bracket of 50%. This 50% represents her **marginal tax rate**.

So, $200,000 + 50\% \times (600,000 - 500,000) = \text{EUR } 250,000$.

EXAMPLE: Taxation of employment income and investment income

Using the information from the previous example, **calculate** the tax that Stella Baghurst would have to pay if her income from employment was expected to be EUR 450,000, and she is to receive EUR 60,000 of interest income and EUR 100,000 of dividends, in the following two cases:

1. There is no favorable tax treatment for investment income.
2. EUR 25,000 of interest income is exempt from tax, and dividends are taxed at a favorable rate of 20% for all income levels.

Answer: Case 1

As all income is treated equally, we can work out the tax on EUR 610,000 (= 450,000 + 60,000 + 100,000). Using the shortcut of Column 3, the tax is $200,000 + 50\% \times (610,000 - 500,000) = \text{EUR } 255,000$, representing an average tax rate of $255,000 / 610,000 = 41.8\%$ on her total income.

Answer: Case 2

Tax on employment income = $450,000 \times 0.40 = \text{EUR } 180,000$.

The interest income incurs 40% tax on the excess over EUR 25,000 = $40\% \times 35,000 = \text{EUR } 14,000$.

Tax on the dividend income = $20\% \times 100,000 = \text{EUR } 20,000$.

Total tax liability = $180,000 + 20,000 + 14,000 = 214,000$, representing an average tax rate of $214,000 / 610,000 = 35.08\%$ on her total income.

Impact of Taxes on Investment Returns

When income is taxed on an annual basis, this can be described as an **accrual tax**. The alternative would be a **deferred tax** or **deferral basis**, where the tax due is postponed to a future date. Dividends and interest income are usually taxed on an accrual basis; capital gains are usually taxed on a deferral basis.



PROFESSOR'S NOTE

Use of the word *deferred* in this context has no link whatsoever with the accounting concept of deferred tax.

If pretax returns are expressed as R , and the tax rate is t_x , then each unit of investment in currency terms will grow to a final value over T years, as shown by the following:

$$FV = [1 + R(1 - t_x)]^T$$

By comparing the FV of an investment with and without tax, we can establish the **tax drag**, which is the negative effect of taxes on an investment's net returns.

EXAMPLE: Tax drag

Stella Baghurst has an investment of EUR 50,000 in a country where a flat-rate tax of 25% is applied to all types of income. This investment is expected to return 8% income per year over a 20-year time horizon. This return is to be taxed annually.

1. What is the expected wealth in 20 years, after tax?
2. What proportion of potential investment gains is consumed by taxes (i.e., tax drag)?
3. What would the tax drag be if the investment horizon was 30 years, with all other variables the same?

Answer:

1. The investment grows at 8%, but 25% of that is taxed away each year—with the rest reinvested. The final value of the investment after tax is:

$$\text{EUR } 50,000 \times [1 + 0.08(1 - 0.25)]^{20} = \text{EUR } 160,357$$

2. In the absence of tax, the investment would have grown to:

$$\text{EUR } 50,000 \times [1 + 0.08]^{20} = \text{EUR } 233,048$$

Tax has reduced the final value of the investment by $233,048 - 160,357 = 72,691$, which represents a tax drag of $72,691 / (233,048 - 50,000) = 39.7\%$ of the potential return. This 39.7% tax drag exceeds the tax rate of 25% due to the compounding effect of losing 25% each year on the final value.

3. In the absence of tax, the investment would have grown to:

$$\text{EUR } 50,000 \times [1 + 0.08]^{30} = \text{EUR } 503,133$$

With tax, the investment would be worth:

$$\text{EUR } 50,000 \times [1 + 0.08(1 - 0.25)]^{30} = \text{EUR } 287,175$$

The tax has reduced the potential investment return by $503,133 - 287,175 = 215,958$, representing a tax drag of $215,958 / (503,132 - 50,000) = 47.7\%$.

The tax drag can have a substantial effect on investment returns, especially over longer time periods. It also has a higher proportional impact when the rate of pretax return is higher.

Impact of Tax Deferral

Capital gains are usually taxed on a deferred basis, resulting in a lower tax drag. The price appreciation is not taxed until the asset is sold and the gain is realized. The annual gains effectively accumulate tax free until the end of the investment horizon when they are taxed.

The future value per unit of initial investment can be calculated as:

$$FV = (1 + R)^T - [(1 + R)^T - 1] \times t_{cg}$$

This can be rearranged to:

$$FV = (1 + R)^T(1 - t_{cg}) + t_{cg}$$



PROFESSOR'S NOTE

The first formula follows the *logic* of the calculation more clearly. The investment grows in value by $R\%$ per year (first term), then the excess over the initial value of 1 is taxed at the capital gains tax rate (second term). You may be safer to use this logic rather than following a rote learned formula, as it will alert you to whether your answer is sensible.

EXAMPLE: Tax deferral

Stella Baghurst has an investment of EUR 50,000 in a country where a flat-rate tax of 25% is applied to all types of income and investment returns. This investment is expected to return 8% per year over a 20-year time horizon. The return is all in the form of capital gains and will be paid when the asset is sold at the end of 20 years. What is Baghurst's expected after-tax wealth in 20 years, and what is the tax drag?

Answer:

$$FV = \text{EUR } 50,000 \times 1.08^{20} - \text{EUR } (50,000 \times 1.08^{20} - 50,000) \times 25\% = \text{EUR } 187,286.$$

In the absence of tax, the investment would have grown to EUR 233,048, as in the previous example.

The potential return consumed by tax is $233,048 - 187,286 = 45,762$, which represents a tax drag of $45,762 / (233,048 - 50,000) = 25\%$.

We can summarize some important points regarding deferral and accrual taxes that are illustrated by these examples:

- The tax drag is the same as the tax rate if all the return is taxed at the end of the investment horizon (i.e., under deferred capital gains tax).
- The tax drag increases with higher investment returns when taxed annually.
- The tax drag increases with longer time periods when returns are taxed annually.

This means that some longer-term investments with annual tax, such as fixed income, will suffer significant effects from taxation eroding the final value.

In many countries, tax-advantaged accounts are available, which are essentially tax wrappers that can be applied to investments to defer or avoid certain taxes. An example of this is a retirement investment plan, where investments can grow through income or price appreciation free of tax until a point in the future. This is a further example of tax deferral, where the tax drag is reduced to the tax rate, as illustrated previously.

Impact of Basis on Capital Gains

The terms **basis**, **cost basis**, or **tax basis** are used to denote the starting value of an investment for the capital gains tax calculation. For example, although shares may currently be worth GBP 20,000, they may have been purchased for GBP 5,000. If they are expected to be sold for GBP 30,000 in a few years' time, the gain will be GBP 25,000, not GBP 10,000. In effect, investments with a low tax basis have an untaxed liability that is being stored up until the investment is sold and the gain is realized.

This can be incorporated into the formula for the future value by applying an adjustment factor of B , which is the ratio of the cost basis to the current value. In this example, $B = 5,000 / 20,000 = 0.25$:

$$FV = (1 + R)^T(1 - t_{cg}) + t_{cg} - (1 - B) \times t_{cg}$$

This can be rearranged to:

$$FV = (1 + R)^T(1 - t_{cg}) + B \times t_{cg}$$



PROFESSOR'S NOTE

The formula starts to look a bit daunting, but the new final term in the first version just represents the taxation of the gap between the current value and the tax basis, or the untaxed 15,000 gain ($20,000 - 5,000$, or $0.75 \times 20,000$). The second is a tidied-up version. However, you can always put in the numbers logically and get to the final answer without the use of a formula—try that in the following worked example.

EXAMPLE: Tax basis

Stella Baghurst's investment of EUR 50,000 has a cost basis of EUR 20,000. All other facts remain the same as the previous examples: a price appreciation of 8% per year, an investment horizon of 20 years, and a tax of 25% on a deferred basis. **Calculate** the after-tax value of Baghurst's investment and the tax drag.

Answer:

$$FV = \text{EUR } 50,000 \times \{(1.08)^{20} (1 - 0.25) + 0.25 - [1 - (20,000 / 50,000)] \times 0.25\} = 179,786$$

Without tax, the final value would be EUR 233,048 (calculated previously).

The potential return consumed by tax is $233,048 - 179,786 = 53,262$, representing a tax drag of $53,262 / (233,048 - 50,000) = 29.1\%$. This is higher than the tax rate due to the EUR 30,000 of gains above the cost basis that will be taxed in addition to the future gains.

It may be more logical to work out the future value as the final pretax value less the tax on the increase over the cost basis. This may be more intuitive:

$$FV = 50,000 \times (1.08)^{20} - (50,000 \times 1.08^{20} - 20,000) \times 25\% = \text{EUR } 179,786.$$

Impact of Inflation

An investment may grow in nominal terms, but the effect of inflation may significantly reduce the purchasing power of the final investment by the time it is realized. It may be useful to consider the *real after-tax value* of investment options to make an informed decision based on actual purchasing power. Because taxes are levied on *nominal* price appreciation rather than real appreciation, inflation exacerbates the eroding impact of taxes on long-term gains. In other words, although the increase in price of an asset may just be keeping up with inflation, it will be taxed as a gain.



PROFESSOR'S NOTE

If you are asked to adjust a future value for the effect of 2% inflation over five years, you might take a discounting approach—in other words, divide by $(1 + 0.02)^5$ —or you could remove 2% per year (i.e., multiply by 0.98^5). The answers are slightly different, and that difference increases over longer time periods. However, both approaches are used in curriculum examples, so either should be marked as correct in a written question. We will use the former version throughout our examples. In practice, within the context of estimating something as uncertain as inflation over a long time period, any difference would be dwarfed by forecasting uncertainty.

EXAMPLE: Impact of inflation

Using the information from the previous example and assuming a long-term average inflation rate of 3% per year, what would Stella Baghurst's expected wealth be in real (purchasing power-adjusted) after-tax terms after 20 years?

Answer:

In the previous example, we established a nominal after-tax investment value of EUR 179,786. To adjust for the effects of 3% inflation, we discount this by 3% for 20 years:

$$FV_{\text{inf, after tax}} = \text{EUR } 179,786 / (1.03)^{20} = \text{EUR } 99,543$$

This is still a gain in real terms, as the initial investment is EUR 50,000, but it does highlight that due to inflation, EUR 179,786 in 20 years' time does not have the same purchasing power as EUR 179,786 today—even with relatively low levels of inflation.

A substantial portion of wealth can be lost to inflation, especially in long-term investments. Inflation can be particularly detrimental to fixed-income investments as it devalues the returns on these investments in real terms.

COMPREHENSIVE EXAMPLE

This scenario brings together income, price appreciation, taxes, and the impact of inflation.

Stella Baghurst has EUR 200,000 invested in a portfolio, which is expected to yield 3% in nominal annual dividend income and 6% in nominal annual price appreciation. The dividend income is taxed at 20% annually, and the capital gain is also taxed at 20% when realized in 15 years' time. Inflation is estimated to be 2.5% per year on average.

For simplicity, ignore any impact of capital appreciation on the dividend yield.

1. What is the expected wealth in after-tax terms in 15 years?
2. What is the expected wealth in real, after-tax terms in 15 years?
3. What is the expected wealth in after-tax terms in 15 years if the dividend income is 6% and the annual price appreciation is 3%?
4. What is the expected wealth in real, after-tax terms in 15 years if the dividend income is 6% and the annual price appreciation is 3%?

Answer:

1. The investment will grow to:

$$\begin{aligned} & \text{EUR } 200,000 \times [(1 + 0.03 \times (1 - 0.2))^{15} + (1 + 0.06)^{15}(1 - 0.2) + 0.020] \\ & \text{EUR } 200,000 \times [1.4272 + 1.9172 + 0.20] \\ & \text{EUR } 200,000 \times 3.5444 = 708,880 \end{aligned}$$

2. After adjusting for inflation of 2.5% per year, EUR 708,880 has a real value in purchasing power terms of $708,880 / 1.025^{15} = \text{EUR } 489,457$.

$$\begin{aligned} & \text{EUR } 200,000 \times [(1 + 0.06 \times (1 - 0.2))^{15} + (1 + 0.03)^{15}(1 - 0.2) + 0.020] \\ & \text{EUR } 200,000 \times [2.0203 + 1.2464 + 0.20] \\ & \text{EUR } 200,000 \times 3.4667 = 693,334 \end{aligned}$$

4. After adjusting for inflation of 2.5% per year, EUR 693,334 has a real value in today's purchasing power terms of $693,334 / 1.025^{15} = \text{EUR } 478,727$.

This demonstrates that due to the different impact of tax drag on accrual and deferred taxes, even though the total return is 9% in both cases, the tax treatment results in different final values—both in nominal and in real terms.



PROFESSOR'S NOTE

This calculation is performed according to the methodology used in the 2025 Level III curriculum.

MODULE QUIZ 9.4

1. Consider an investor with employment income of EUR 150,000, realized capital gains of EUR 100,000, and dividend income of EUR 25,000. Assume that all sources of income are treated equally, using the tax rates as follows:

Taxable Income Over (EUR)	Up To	Tax on Column 1	Percentage on Excess Over Column 1
0	10,000	—	5%
10,000	50,000	500	10%
50,000	100,000	4,500	20%
100,000	250,000	14,500	30%
250,000	—	59,500	40%

The investor's average tax rate is *closest* to:

- 25%.
 - 30%.
 - 40%.
- Using the same information in Question 1, but assuming dividend income is exempt from tax and capital gains are taxed at 20% for all income levels, what is the total tax liability?
 - EUR 29,500.
 - EUR 49,500.
 - EUR 65,000.
 - Under a progressive tax regime, the average tax rate for a taxpayer in a high band will be:
 - less than the marginal rate.
 - equal to the marginal rate.
 - greater than the marginal rate.
 - With accrual tax on investment income, the tax drag:
 - is higher than the applied tax rate.
 - decreases for higher rates of return.
 - increases for shorter investment periods.
 - An investment has a market value of GBP 80,000 and a cost basis of GBP 20,000. If price appreciation is 7% per year and the tax on capital gains is 30%, the expected after-tax investment value in GBP in 10 years is *closest* to:
 - GBP 80,000.
 - GBP 116,000.
 - GBP 134,000.
 - Which of the following statements regarding the impact of inflation on after-tax investment returns is *least accurate*?
 - Inflation has a greater eroding impact on after-tax gains than on annual income.
 - As long as the gap between the nominal return and the inflation rate is the same, the impact of inflation on returns is the same.
 - Tax-advantaged accounts provide protection against the effects of taxation, but not against the loss of purchasing power caused by inflation.

MODULE 9.5: INDIVIDUAL INVESTORS AND INVESTMENT POLICY STATEMENTS



Video covering this content is available online.

LOS 9.e: Discuss the differences between private and institutional clients and formulate an appropriate Investment Policy Statement

The IPS documents a private client's investment objectives, risk tolerance, investment time horizon, liquidity preferences, and any other preferences or constraints. The private wealth manager uses this information to construct the client's investment portfolio given the prevailing capital market conditions.

An IPS for a private client usually covers the following areas:

- Client background and investment objectives.
- Key investment parameters.
- Portfolio asset allocation.
- Portfolio management and implementation.
- Duties and responsibilities of the private wealth manager.

Client Background and Investment Objectives

A private client's background details are obtained from *personal*, *financial*, and *tax* information that the wealth manager has gathered on the client (discussed earlier in the reading). As part of the client's background, the private wealth manager should determine all the components of a client's investment portfolio as well as any other financial assets that the client may be holding outside the portfolio (e.g., with a different wealth manager) and cash flows from external sources (e.g., defined benefit pension).

We have already seen that clients may have *planned* and *unplanned* financial goals and objectives, which may be *ongoing* or *one-off* in nature. The private wealth manager should work with a client to *quantify* investment objectives wherever possible and reconcile *competing* objectives should they arise. Where a client has *multiple* objectives, the wealth manager can help the client *prioritize* these objectives into *primary* and *secondary* objectives.

As already discussed, a wealth manager can use *capital sufficiency* (or capital needs) *analysis* to determine the likelihood of their clients being able to meet their financial objectives and, where necessary, help clients revise these objectives to make them more realistic.

For the Exam: Past exam questions have required candidates to specify risk and return objectives when preparing an IPS. In this reading, you are required to prepare investment objectives separately from risk tolerance, which is considered under investment parameters.

EXAMPLE: Preparing client investment objectives

William Elam recently inherited \$750,000 in cash from his father's estate and has come to Alan Schneider, CFA, for investment advice. Both William and his wife, Elizabeth, are 30 years old. William is employed as a factory worker and has an annual salary of \$50,000. Although he receives total health care coverage for himself

and his family, he makes no contributions to his firm's defined benefit pension plan and is not yet vested in any of the company's other retirement benefits. Elizabeth is an early childhood teacher with a salary of \$38,000. She has only very recently opened a tax-deferred 403(b) retirement savings account. They have three children, aged eight, five, and three. They have a small savings account, no investments other than Elizabeth's retirement account, and credit card debt of \$20,000.

When interviewed, William makes the following statements:

- "With a family of five, our combined salaries just meet our living expenses. It would be safe to assume that both our salaries and expenses will grow only at the rate of inflation."
- "We do not want to use our new wealth to improve our current lifestyle. Instead, we would like to grow the investment portfolio so that we can send our children to college and fund our retirement lifestyle when we stop working in 30 years."
- "We also want to set up a trust fund in the future for our children."

What are the key issues that Schneider should consider when preparing the investment objectives section of William's IPS?

Answer:

The purpose of William's investment portfolio is to pay for his children's college education, fund the retirement of him and Elizabeth, and set up a trust fund for his children. William has stated they do not want to use his inheritance to improve their current lifestyle. Since William and Elizabeth earn an income that covers their living expenses on an inflation-adjusted basis, distributions from the investment portfolio will begin when their children commence their college education in approximately 10 years (apart from paying off their credit card immediately). After paying for their children's college education, the couple will require distributions from the investment portfolio to set up the trust fund for their children and to fund their retirement.

Schneider should help the Elams *quantify* and *prioritize* their multiple investment objectives. He could use capital sufficiency analysis to determine the likelihood of these competing objectives being met given the size of the investment portfolio. He should also help them reevaluate and revise their current objectives if these objectives are not supported by capital sufficiency analysis.

Key Investment Parameters

A client's risk tolerance, time horizon, investment preferences, and constraints are covered in this section.

Risk tolerance. As discussed previously, risk tolerance considers a client's willingness and ability to accept investment risk. Generally, a client has a *low risk tolerance for more important goals* but higher risk tolerance for lower priority goals. An additional consideration is the proximity of the client's goals, with *near-term goals associated with lower risk tolerance* compared to longer-term goals. The process of evaluating a

client's risk tolerance (e.g., questionnaires and/or conversations) is also covered in this section.

Time horizon. The investment horizon is often described as a *range* (e.g., in excess of 15 years for a long investment horizon or less than 10 years for a short horizon) rather than a specific length of time. Clients with multiple objectives can also have a different time horizon for each objective.

EXAMPLE: Time horizon

How should Schneider describe William's time horizon in the previous example?

Answer:

William has multiple objectives with different time horizons. The time horizon related to funding his children's college education exceeds 10 years. Assuming a trust fund is set up for his children after their college education, this time horizon is likely to exceed 20 years. Finally, the time horizon associated with retirement funding exceeds 30 years.

Asset class preferences. This section should list the *acceptable* asset classes for the client's portfolio (or alternatively asset classes that are unsuitable for the client), together with the risk-return characteristics of each asset class.

Liquidity preferences. Liquidity needs that have not been specified in the *Client Background and Objectives* section should be included here (e.g., the need for a cash reserve). A private wealth manager should also include liquidity preferences that may restrict investment in certain asset classes (e.g., a client's preference for dividend income may preclude investment in the stock of small, growth companies).

Other investment preferences. Some unique preferences include a concentrated position in a single stock (due to past employment or inheritance) and ethical investing.

Constraints. These client constraints restrict a private wealth manager's choice of investments or strategies for the client's portfolio (e.g., a client's preference for ethical investing).

For the Exam: Past exam questions have required candidates to analyze a private client's time horizon, liquidity needs, taxes, legal and regulatory considerations, and unique preferences as investment constraints. *In this reading, risk tolerance, time horizon, liquidity preferences, other investment preferences, and constraints are analyzed as investment parameters, while taxes are included as part of the client's financial background information.*

For the most part, you are provided with all the relevant information for a client's investment parameters in the story. A typical question might require you to address all the previously mentioned investment parameters in 10–12 minutes. You should give a brief factual answer for each parameter, supported by relevant facts from the

story. If there are no issues to address for a particular parameter, say so in the answer rather than leaving it blank.

Alternatively, a question may only ask you to address specific investment parameters and assign more minutes for each parameter. In this case, only address what is requested and provide more detail in your answer.

Portfolio Asset Allocation

This section describes the asset allocation approach that the private wealth manager will use for the client's investment portfolio. *Strategic* asset allocation indicates a long-term target allocation for each asset class, with the portfolio being rebalanced periodically to maintain the target allocation. *Tactical* asset allocation is an active management strategy that normally specifies a range for each asset class rather than a specific target allocation percentage.

Portfolio Management and Implementation

In order to effectively manage a client's investment portfolio on an ongoing basis, the private wealth manager needs clear guidance on the following issues:

Discretionary authority. This specifies the ability of the private wealth manager to take investment actions without first seeking the client's approval. Some clients give their wealth managers *full* discretion, whereas others prefer to *limit* discretionary authority to prespecified actions (such as rebalancing the portfolio in line with the agreed range for each asset class). A wealth manager providing a *nondiscretionary* service can make investment recommendations but is unable to act on the recommendation without client approval.

Rebalancing. The approach to rebalancing a client's investment portfolio should be clearly specified in the IPS. A *time-based* rebalancing (e.g., quarterly, semiannual, or annual rebalancing) does not consider deviations between actual and target asset class percentages, whereas a *threshold-based* rebalancing approach means that the portfolio is rebalanced once actual asset class weights deviate from target weights by a prespecified amount.

Tactical changes. The IPS should clearly state if a private wealth manager is given discretionary authority to undertake tactical asset allocation changes. The IPS should clearly state the acceptable range of weights for each asset class as well as the extent to which the manager is allowed to go beyond the upper or lower bounds when making tactical changes.

Implementation. This section covers information about acceptable investment vehicles (e.g., the use of in-house and/or external money managers, ETFs, mutual funds) and the due diligence process for making investment decisions.

Duties and Responsibilities of the Private Wealth Manager

The general responsibilities of a private wealth manager in helping a client meet their investment objectives are detailed in this section. These responsibilities include:

- Formulating and reviewing the IPS, including frequency of review.
- Recommending or selecting investment options and constructing the investment portfolio's asset allocation.
- Monitoring and rebalancing the portfolio.
- Monitoring portfolio implementation costs.
- Monitoring the third-party service providers.
- Reporting portfolio performance.
- Reporting taxes and financial statements.
- Voting proxies.

IPS Appendix

This section includes details of items that typically change more frequently than other sections of the IPS, such as the following:

- *Modeled portfolio performance.* This typically describes a range of possible portfolio outcomes over different investment horizons as well as a distribution of returns at specific percentiles.
- *Capital market expectations.* This covers the expected return, risk, and correlations of the asset classes that the private wealth manager can include in a client's portfolio.

The following example illustrates how you could be tested on an IPS for a private client. The nature of constructed response questions gives you some latitude in developing an acceptable answer and, in some cases, there may be more than one acceptable answer. You will be graded on whether you answer the questions in a way that is consistent with what is taught in the curriculum.

EXAMPLE: Evaluating an IPS for a private client

Bonnie DuBois, a 65-year-old U.S. citizen, has been retired for 5 years. Over that period, she has helped to support her son, Barry, and his family. DuBois's son and his wife, Betty, have both received significant promotions, so they no longer require her support.

DuBois is meeting with her financial advisor, Begren Knutsen, CFA, to determine if and how her IPS should be altered. She does not intend to change her modest lifestyle, and since she no longer needs to provide financial support to her son and his family, DuBois will instead plan bequests. She also specifies that the portion of the portfolio allocated to equities should use only domestic equities.

When Knutsen reviewed DuBois's IPS a year ago, she did not recommend any changes to the IPS or investment strategy. The value of DuBois's portfolio remains

unchanged at \$2 million. DuBois and Knutsen estimate her investment horizon will exceed 15 years. DuBois's highest priority is to be able to withdraw \$75,000 per year on an inflation-adjusted basis to cover her living expenses. As unexpected expenses are likely to increase, she states the portfolio's cash reserve should be raised to \$25,000. She also plans to leave a bequest of \$1.2 million each to her son and to a local museum (\$2.4 million in total) at her death.

Knutsen and DuBois have agreed to review her objectives, investment parameters, and asset allocation considerations at this meeting so that Knutsen can model DuBois's portfolio behavior with updated capital market assumptions. The sections of DuBois's current IPS that will be discussed at the meeting are shown in Figure 19.4. DuBois does not require any changes to be made to the *Portfolio Management, Responsibilities, and Review* sections of her IPS.

Discuss the changes that Knutsen should make to DuBois's original IPS to incorporate her *new retirement objectives* and *investment preferences*. You are *not* required to provide any specific asset class weights for the portfolio asset allocation as part of your answer.

Figure 19.4: Excerpts From Bonnie DuBois's Original Investment Policy Statement

Background and Investment Objectives

This investment policy statement (IPS) has been created for Bonnie DuBois for the purpose of meeting her financial objectives. It outlines her objectives and investment parameters, recommends an investment strategy for achieving these objectives, and details ongoing duties and responsibilities.

The objectives of this portfolio are to support the retirement lifestyle of DuBois, support her son and his family for one year, and gift her estate to a local museum at her death. The financial support for her son and his family is her primary objective, followed by the maintenance of her current lifestyle and her charitable donation at death. In order to achieve these objectives, DuBois anticipates needing her portfolio to distribute \$90,000 per year on an inflation-adjusted basis. DuBois has not specified a specific monetary amount that she intends to gift to a local museum at death. The wealth manager will work with DuBois on an ongoing basis to quantify this objective.

DuBois's current portfolio of \$2 million is held in a taxable account and a tax-deferred account. Expected cash distributions have been given due consideration when constructing her portfolio asset allocation. As her investment horizon is relatively long-term, she is seeking to achieve a higher rate of return commensurate with her risk tolerance.

Investment Parameters

Risk tolerance. DuBois is able and willing to accept volatility in the short and medium term. She acknowledges that this risk tolerance has been

reflected in her current asset allocation.

Investment horizon. DuBois has an investment horizon that exceeds 15 years.

Asset class preferences. DuBois and her wealth manager have determined that the following asset classes are appropriate for her portfolio:

- Cash and money market instruments.
- Domestic government bonds.
- Domestic corporate bonds.
- Global government bonds.
- Domestic equities.
- Global equities.
- Domestic real estate securities.
- Commodities.

Other investment preferences. DuBois wishes to maintain her position in Chic Apparel, Inc., where she spent most of her 35-year career in the fashion industry before retiring. This position does not represent a significant concentration risk in her portfolio and stocks of Chic Apparel are actively traded on the domestic stock exchange.

Liquidity preferences. DuBois wishes to maintain a \$10,000 cash reserve within her portfolio.

Constraints. DuBois's position in Chic Apparel has significant embedded capital gains.

Portfolio Asset Allocation (Strategic Allocation With Rebalancing Limits Provided in Brackets)

Cash and money market instruments	5% (4%–6%)
Domestic government bonds	10% (8%–12%)
Domestic corporate bonds	10% (8%–12%)
Global government bonds	10% (8%–12%)
Domestic equities	40% (35%–45%)
Global equities	10% (8%–12%)
Domestic real estate securities	10% (8%–12%)
Commodities	5% (4%–6%)

Answer:

DuBois's IPS needs to be modified to reflect her new investment objectives and parameters. These changes are detailed later.

Background and Investment Objectives

Since DuBois no longer needs to support her son and his family, her primary objective is now her retirement lifestyle. She also plans to leave a bequest of \$1.2 million each to her son and to a local museum.

The second paragraph of the *Background and Investment Objectives* section of her current IPS should be modified as follows:

The objectives of this portfolio are to support the retirement lifestyle of DuBois and to leave a bequest of \$1.2 million each to her son and a local museum (\$2.4 million in total) at her death. The financial maintenance of her retirement lifestyle is her primary objective, followed by the bequests to her son and a local museum at death. DuBois anticipates needing her portfolio to distribute \$75,000 per year on an inflation-adjusted basis to cover her living expenses. The wealth manager will work with DuBois to ensure that her portfolio distribution rate is sustainable throughout retirement and reevaluate her other financial objectives if these are not supported by capital sufficiency analysis.

Investment Parameters

Risk tolerance. No changes required.

Investment horizon. No changes required, as it is still reasonable to expect her investment horizon to exceed 15 years.

Asset class preferences. DuBois states that her portfolio allocation to equities should only consist of domestic equities. Her wealth manager should advise her on the potential return and diversification implications of her decision. Mean-variance optimization of DuBois's portfolio should incorporate the constraint on investment in foreign equities.

The wording for asset class preferences should be modified as follows:

DuBois and her wealth manager have determined that the following asset classes are appropriate for her portfolio:

- Cash and money market instruments.
- Domestic government bonds.
- Domestic corporate bonds.
- Global government bonds.
- Domestic equities.
- Domestic real estate securities.
- Commodities.

Other investment preferences. No changes required.

Liquidity preferences. DuBois wishes to increase the cash reserve from \$10,000 to \$25,000. This change should be clearly stated as follows:

DuBois wishes to maintain a \$25,000 cash reserve within her portfolio.

Constraints. This section should be modified as follows to incorporate the constraint on investment in foreign equities:

DuBois's portfolio allocation to equities should consist only of domestic equities. DuBois's position in Chic Apparel has significant embedded capital gains.



MODULE QUIZ 9.5

1. A private wealth manager has gathered the following information from a new client:

Risk tolerance:	Low
Liquidity needs:	\$2 million for purchase of holiday apartment in two years
Asset class preferences:	No investment in commodities and hedge funds

What information is *most likely* to be included in the Investment Objectives section of the client's IPS?

- A. Low risk tolerance.
 - B. \$2 million purchase of a holiday apartment in two years.
 - C. Investments in commodities and hedge funds have not been approved by the client.
2. Which of the following investment considerations is *most likely* to be included as a constraint in a client's IPS?
 - A. ESG investing.
 - B. Time horizon.
 - C. Liquidity preferences.
 3. Which of the following items is *most likely* to be included in the Portfolio Management section of a client's IPS?
 - A. Capital market expectations.
 - B. Modeled portfolio behavior.
 - C. Portfolio rebalancing methodology.
 4. The requirement for a client's investment portfolio to hold a cash reserve and/or constraint on asset class selection because of the need to sell the portfolio relatively quickly is *most likely* to be included in the:
 - A. Liquidity Preferences section of the client's IPS.
 - B. Other Investment Preferences section of the client's IPS.
 - C. Portfolio Asset Allocation section of the client's IPS.
 5. Vivian Collins is a client of ESP Financial Advisors. She is 45 years old and expects to retire in 20 years. Her financial advisor has determined that Collins has the following financial goals:

- Retirement:** Collins views retirement as a long-term goal and is prepared to accept a 10%–15% drop in expected retirement spending. However, she is concerned that she might face unexpected health-related expenses in retirement.
- College fees:** Collins wants to be able to pay for her daughter's college education in the next 3–6 years. Currently, this is her highest priority goal.
- Gifting:** Collins would like to leave a gift to her grandchildren at her death.

Which of the following descriptions of Collins's investment time horizon is her financial advisor *most likely* to include in her IPS?

- A. Collins has a long horizon of 35 years, as she would expect to survive until 80 years old.
- B. Collins has multiple time horizons: the college fees goal has a time horizon of 3 years, the retirement goal has a time horizon of 20 years, and the gifting goal has a time horizon of 35 years.
- C. Collins has multiple time horizons: the college fees goal has a time horizon exceeding 3 years, the retirement goal has a time horizon exceeding 20 years, and the gifting goal has a time horizon exceeding 35 years.

KEY CONCEPTS

LOS 9.a

A key measure of wealth is net worth, which refers to the value of all assets owned, less any liabilities or debts. Assets can be further split into categories, including financial wealth, real wealth, personal wealth, and productive wealth.

Since World War II, the global economy has shown significant growth in GDP per capita—and, hence living standards. This growth has been influenced by technological developments, increased competition, growth of free-market capitalism, business-friendly government policies, and easier access to finance for investment.

Wealth inequality measures such as the Gini coefficient show persistent and increasing wealth and income inequality. The Gini coefficient ranges from 0 to 1, with 0 indicating wealth equality (everyone has an equal share of the wealth) and higher values indicating higher concentration.

LOS 9.b

An individual's life can be characterized using the seven financial stages: education, early career, career development, peak acculturation, preretirement, early retirement, and late retirement.

Human capital is the PV of an individual's future earnings, and it can be estimated using current income levels, growth, the number of working years remaining, and probability of survival. These are discounted at a nominal risk-free rate, adjusted by a risk premium linked to the volatility of the income stream.

Individuals should use available financial capital to diversify the risk inherent in their human capital.

Return objectives must consider how to protect against inflation. Assets such as equities and commodities may provide a return that outpaces inflation in the long run.

A client's risk tolerance includes both risk capacity (objective measure of the client's situation) and risk perception (their attitude toward risk).

Wealth managers assist their clients in formulating, prioritizing, and implementing their financial objectives by prioritizing goals and implementing investment strategies. Goals can be planned, such as retirement, or unplanned, such as property repairs or ill health.

LOS 9.d

Investment returns, comprising interest, dividends, and capital gains, may be taxed differently.

The tax drag is higher for accrual-based (annual) taxes, and it increases with higher returns and longer investment periods.

Deferral of tax, as often applies for capital gains, reduces the tax drag to the tax rate (if the tax basis = current market value).

Inflation erodes the purchasing power of investments. Solely focusing on nominal returns can distort the perception of an investment's real, after-tax long-term performance. Investors should, therefore, jointly assess the impacts of tax and inflation.

LOS 9.e

An IPS for private clients should contain the following elements:

- *Client background and investment objectives.* A client's background details are obtained from relevant personal, financial, and tax information. Investment objectives may be planned, unplanned, ongoing, or a one-off. Multiple objectives should be prioritized into primary and secondary objectives.
- *Key investment parameters.* Low risk tolerance is usually associated with high-priority goals and near-term goals. Time horizon is described as a range (e.g., in excess of 15 years for a long horizon and less than 10 years for a short horizon). When a client has multiple objectives, there may be different time horizons for each objective. Other investment parameters include asset class preferences, liquidity preferences (including a cash reserve), unique investment preferences, and constraints restricting investments for a client's portfolio.
- *Asset allocation.* Strategic asset allocation indicates a long-term target allocation for each asset class, with the portfolio being rebalanced periodically to maintain the target allocation. Tactical asset allocation is an active management strategy that normally specifies a range for each asset class rather than a specific target allocation percentage.
- *Portfolio management and implementation.* This covers wealth manager guidelines in relation to discretionary authority, portfolio rebalancing, tactical asset allocation changes, and acceptable investment vehicles that can be used to implement a client's investment strategy.

- *Wealth manager duties and responsibilities.* These include formulating and reviewing the client's IPS; constructing the portfolio; monitoring and rebalancing the portfolio; monitoring portfolio costs and third-party providers; and reporting portfolio performance.
- *IPS appendix.* This section includes modeled portfolio performance and capital market expectations.

ANSWER KEY FOR MODULE QUIZZES

Module Quiz 9.1

1. **B** Shares in a family business are included in the category of productive assets. Vested benefits are those that have accrued in a defined benefit pension plan and are included in an individual's aggregate wealth. (LOS 9.a)
2. **A** State ownership is the opposite to a free-market approach and represents a move toward centrally planned and controlled economies with less competition and incentive to improve. The opening up of countries to international trade and competition, as well as the move toward free-market economies, has contributed to long-term growth and wealth. (LOS 9.a)
3. **B** In Eastern Europe, there are many oligarchs, politically well-connected and wealthy individuals who have benefitted from ownership of natural resources or previously state-run enterprises. (LOS 9.a)
4. **C** Sudden fame is an example of new wealth creation. Lottery wins and inheritances represent a transfer of wealth within the country. (LOS 9.a)
5. **A** Due to inflation, the value of wealth in local currency terms would be expected to rise, but when measured in foreign currency terms, the GDP per capita would be lower due to the weakening of the currency. (LOS 9.a)
6. **A** The rise in the Gini coefficient means an increase in inequality. Inequality tends to increase during periods of economic contraction or crises. Higher tax rates for the rich and more social support for the poor should reduce inequality. (LOS 9.a)
7. **C** A Gini coefficient of anything greater than zero means a degree of wealth inequality, where wealth is concentrated rather than equally spread out. Therefore, there is positive skew, and the mean will be greater than the median. (LOS 9.a)

Module Quiz 9.2

1. **A** The discount rate is the nominal risk-free rate because the income cash flows will be in nominal terms. The other statements are accurate. (LOS 9.b)
2. **A** Human capital would appear on the asset side of a holistic balance sheet. Both the PV of future consumption and planned bequests are liabilities. (LOS 9.b)

3. **B** The issue here is risk diversification. An entrepreneur has equity-like risk in their human capital, so they should balance this with less risk in their financial capital. By contrast, a government employee would usually have a stable but lower growth income stream, so they can afford to take more risk in their financial assets to invest for growth in the longer term. (LOS 9.b)

Module Quiz 9.3

1. **A** Fixed-income securities suffer from inflation in all time periods because the cash flows are fixed; hence, they will be worth less in real terms. Only inflation-linked bonds are designed to protect against inflation, both in the short term and long term. While equities tend to outpace inflation in the long term, in the short term, they can have high price volatility during periods of high inflation due to economic uncertainty. (LOS 9.c)
2. **B** Risk perception is the subjective assessment of risk from the client's perspective. Questionnaires help an advisor understand a client's risk perception. Risk capacity is more objective and is based on the client's circumstances. (LOS 9.c)

Module Quiz 9.4

1. **A** Column 3 can be used as a shortcut, or you can work through each slice of income individually. As all sources are treated equally, the total taxable income is EUR 275,000. Therefore, the tax is $59,500 + 40\% \times (275,000 - 250,000) = \text{EUR } 69,500$.
If done by income slice, the calculation is $5\% \times 10,000 + 10\% \times (50,000 - 10,000) + 20\% \times (100,000 - 50,000) + 30\% \times (250,000 - 100,000) + 40\% \times (275,000 - 250,000) = \text{EUR } 69,500$.
The average tax rate is $69,500 / 275,000 = 25.3\%$. Take care not to confuse marginal tax rates (the other answer choices) with the average tax rate. (LOS 9.d)
2. **B** Employment income of EUR 150,000 will be taxed first, giving a tax of $14,500 + (150,000 - 100,000) \times 30\% = \text{EUR } 29,500$.
To this will be added 20% of the EUR 100,000 capital gain, giving a total tax liability of EUR 49,500. (LOS 9.d)
3. **A** Under a progressive system, the tax rate increases as taxable income increases. Therefore, as a taxpayer moves up the tax band, they move into higher marginal tax rates—but some of the income remains taxed at a lower rate, pulling the average rate below the marginal rate. (LOS 9.d)
4. **A** Tax drag increases with higher rates of return and longer investment periods, due to the compounding nature of the tax charge on returns. This compounding effect means that the proportion of potential returns lost to tax exceeds the tax rate. (LOS 9.d)
5. **B** The gain that will be taxed is the difference between $\text{GBP } 80,000 \times (1.07)^{10}$ and the cost basis of GBP 20,000, which equals GBP 137,372—taxed at 30%, to give a tax liability of GBP 41,212.
The final value = $80,000 \times (1.07)^{10} - 41,212 = \text{GBP } 116,160$.

This can also be worked out from the formula $(1.07)^{10} (1 - 0.3) + 0.3 \times 0.25 = 1.452$, where 0.25 is the basis as a ratio (B) of 20,000 / 80,000. This is applied to the investment of GBP 80,000 to give $80,000 \times 1.452 = \text{GBP } 116,160$. (LOS 9.d)

6. **B** If nominal returns are, for example, 3%, with inflation at 0%, the real return is 3% and inflation will not affect returns. However, if nominal returns are 7% and inflation is 4%, the real return is still 3%, but inflation will erode purchasing power. The greater the inflation rate, the more the loss of purchasing power, even if the real return remains 3%. The other two statements are accurate. (LOS 9.d)

Module Quiz 9.5

1. **B** The purchase of a holiday apartment is a financial goal and should be included in the Investment Objectives section of the IPS. Risk tolerance and asset class preferences are considered under the Investment Parameters section. (LOS 9.e)
2. **A** ESG investing may require restrictions on investment in certain sectors or securities. These restrictions should be included as constraints in the Investment Parameters section of an IPS. Time horizon and liquidity preferences are included as investment parameters in an IPS. (LOS 9.e)
3. **C** Rebalancing methodology, discretionary authority, tactical asset allocation changes, and implementation are covered in the Portfolio Management section of a client's IPS. Modeled portfolio behavior and capital market expectations are covered in the IPS appendix. (LOS 9.e)
4. **A** A cash reserve and/or constraint on asset class selection because of liquidity needs is covered in the Liquidity Preferences section of an IPS. Other investment preferences might include a concentrated asset position. The Portfolio Asset Allocation section describes the asset allocation approach used for the client's portfolio (e.g., strategic or tactical asset allocation). (LOS 9.e)
5. **C** As each of Collins's financial goals has a different time horizon, Collins will have multiple time horizons. Time horizons should generally be expressed as a range because of the uncertainty associated with each goal (e.g., it is not possible to predict exactly how long Collins's retirement will last). (LOS 9.e)

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READING 10

PORTFOLIO MANAGEMENT FOR INSTITUTIONAL INVESTORS

EXAM FOCUS

This reading addresses the investment policy statement (IPS) of the major types of institutional investors. The IPS contains a formal statement of investment objectives (i.e., return and risk tolerance) and constraints applying to the client. The exam may present a case study with one or more of these types of institutional clients, and you will be asked to prepare or evaluate parts of the IPS, effectively advising the institutional client on how to structure the investment portfolio. We recommend you approach this material from this perspective. The key is to understand what the various institutions are trying to achieve with their investment portfolios and which risk considerations and constraints apply when meeting these goals.

MODULE 10.1: OVERVIEW OF INSTITUTIONAL INVESTORS



Video covering
this content is
available online.

Common Characteristics

LOS 10.a: Discuss common characteristics of institutional investors as a group.

Types of institutional investors considered in this reading include defined benefit and defined contribution pension plans, sovereign wealth funds (SWFs), university endowments, private foundations, banks, and insurance companies. Before discussing the details of the IPS for each type of institution, we note the following five common characteristics that cause institutional investors to differ from individual investors:

1. **Scale (size).** Institutions tend to be larger than individual investors. The largest institutions may be too large for investments or managers with low capacity, such as small-cap equity or venture capital. These large institutions may therefore choose to directly access investments and manage them in-house. Smaller institutions may have issues diversifying across asset classes that have high minimum investment sizes (e.g., private equity or real estate). They may also face issues with hiring skilled investment professionals and instead choose to outsource to external managers and consultants.

2. **Long-term investment horizon.** With some exceptions, institutional investors tend to have longer time horizons than individual investors because institutional investors are driven by the need to meet specific liabilities that are relatively low.
3. **Regulatory framework.** Institutions are subject to different legal, regulatory, accounting, and tax rules than individual investors with the differences among institutional investors based on national jurisdiction. Regulations have been tightened since the 2007–2009 global financial crisis in an attempt to lower leverage, increase centralized clearing, and improve reporting transparency.
4. **Governance framework.** Institutions typically operate under a formal governance structure, whereas governance structures for individuals tend to be less formal. Governance structures are typically composed of a *board of directors* and an *investment committee*, which may be a subcommittee of the board. The board often sets the long-term strategic asset allocation of the institution, with the board and/or investment committee establishing the IPS and monitoring investment performance. The investment committee oversees investment policy. Investment strategy is implemented by an investment office typically headed by a chief investment officer; the investment management takes place either in-house by internal investment staff or is outsourced to external asset managers.
5. **Principal-agent issues.** The principal-agent conflict occurs when a principal (i.e., the owner of assets) appoints an agent to act on their behalf and the agent's interests are not aligned with the principal's interests. For institutions, this conflict occurs internally through the appointment of the investment committee and investment staff and occurs externally through the use of outsourced investment managers. The classic example of an external principal-agent conflict is a high management fee paid to third-party investment managers regardless of performance.

Investment Policy Statement

LOS 10.b: Discuss investment policy of institutional investors.

The IPS should include:

- The institution's *mission* and *investment objectives* (i.e., return and risk tolerance).
- Discussion of the *investment horizon* and *liabilities* that need to be paid by the institution.
- *External constraints* that affect the asset allocation (legal, regulatory, tax, and accounting).
- An asset allocation policy (i.e., portfolio weights) with ranges and asset class benchmarks.
- A rebalancing policy.
- Reporting requirements.

The IPS should be reviewed annually, and revisions should be made when necessary due to material changes in investor circumstances and/or market environment.

While each institution has unique features, four models have evolved as different general approaches to asset allocation. Three of these models are named after approaches used by Norway's sovereign wealth fund, the Yale University endowment, and the Canada Pension Plan, while the fourth model is liability driven. Details of the four models are outlined in Figure 10.1.

Figure 10.1: General Asset Allocation Approaches

Model	Description
Norway's sovereign wealth fund	<i>Asset allocation:</i> ■ Passively managed allocation to public equities and bonds (with traditional 60% equity/40% bonds base case allocation) ■ Little or no exposure to alternative assets ■ Tight tracking error limits <i>Advantages:</i> ■ Low costs and fees ■ Easy for board to comprehend <i>Disadvantages:</i> ■ No opportunity for outperformance of markets
Yale University endowment	<i>Asset allocation:</i> ■ High allocation to alternatives ■ Significant active management ■ Externally managed assets <i>Advantages:</i> ■ Potential for outperformance of markets <i>Disadvantages:</i> ■ Difficult for small institutions without expertise in alternatives ■ May also be difficult for large managers due to capacity issues of external managers ■ High fees/costs
Canada Pension Plan	<i>Asset allocation:</i> ■ High allocation to alternatives ■ Significant active management ■ Internally managed assets ■ Uses a reference portfolio of passive public assets as benchmark that can be easily understood/communicated <i>Advantages:</i> ■ Potential for outperformance of markets and development of internal capabilities <i>Disadvantages:</i> ■ Potentially expensive and difficult to manage
Liability driven	<i>Asset allocation:</i> ■ Focus is on maximizing expected surplus (assets – liabilities) return and managing surplus volatility <i>Advantages:</i> ■ Explicitly recognizes liabilities as part of investment process <i>Disadvantages:</i> ■ Certain risks of liabilities (e.g., longevity) are difficult to hedge

MODULE QUIZ 10.1

1. Eris Private Wealth, Inc., (EPW) provides investment advice to high-net-worth individuals. After a recent merger, EPW acquired some institutional clients. The board of EPW has asked the post-merger management team to prepare a report detailing the key differences between institutional clients and individual clients. The report makes the following two statements:

Statement 1: It is likely that the different scale of institutional clients versus individual clients will narrow the available investment universe.

Statement 2: The governance structure of institutional clients is likely to be more formal than the governance structure of the investment account of an individual client.

How many of the post-merger management team's statements are correct?

- A. Only one statement is correct.
 - B. Neither statement is correct.
 - C. Both statements are correct.
2. The board of the SJT Foundation has specified the following objectives:
- Make an aggressive allocation to alternative investments in order to diversify and hedge against long-term inflation risk.
 - Outsource investment management to external managers due to the lack of experience by internal investment staff in investing in alternative investments.
 - Pursue actively managed strategies to generate long-term outperformance of benchmarks.

The investment approach *most likely* to meet these objectives is the:

- A. Canada Pension Plan model.
- B. Yale University endowment model.
- C. Norway sovereign wealth fund model.

LOS 10.c: Discuss the stakeholders in the portfolio, the liabilities, the investment time horizons, and the liquidity needs of different types of institutional investors.

LOS 10.d: Describe the focus of legal, regulatory, and tax constraints affecting different types of institutional investors.

LOS 10.f: Evaluate the investment policy statement of an institutional investor.

LOS 10.g: Evaluate the investment portfolio of a private DB plan, sovereign wealth fund, university endowment, and private foundation.

The remainder of this reading addresses the details of IPSs of different types of institutional investors. The general outline for each type of institution will be as follows:

- The main features/mission of the institution.
- The stakeholders (i.e., parties impacted by the success/failure of the institution).
- The key elements of the IPS, usually in the following order:
 - Liabilities and investment horizon.
 - Liquidity needs.
 - External constraints.

- Investment objectives.
- Asset allocation.

MODULE 10.2: PENSION FUNDS



Video covering
this content is
available online.

Main Features/Mission

Pension funds are plans designed to save and invest in order to provide income for plan beneficiaries upon retirement. The entity that sets up the plan is referred to as the plan sponsor and is usually an employer. There are two major types of pension plans: (1) **defined benefit (DB)**, in which a plan sponsor defines the *benefit* that will be paid to beneficiaries upon retirement in the future and (2) **defined contribution (DC)**, in which *contributions* to plan assets today are defined, but there is no guarantee of ultimate benefits paid to beneficiaries.

While the exact nature of plans varies depending on jurisdiction, the main differences between DB and DC plans are displayed in Figure 10.2.

Figure 10.2: Defined Benefit vs. Defined Contribution

Feature	Defined Benefit	Defined Contribution
Benefit payments	Contractually defined (usually dependent on final salary) Creates a measurable liability for the plan sponsor	Depends of the performance of investments Once promised contributions have been met, there is no liability for the plan sponsor
Contributions	Primarily by employer (employee may contribute also)	Primarily by employee (employer may contribute also)
Investment decision-making	Pension fund (sponsor and investment staff)	Sponsor provides suite of available investment funds Employee decides level of investment and asset allocation
Investment risk	Faced by sponsor	Faced by beneficiary
Mortality/longevity risk	Pooled at the fund level—beneficiaries who live longer than expected are funded by those who die earlier than expected Risk of general increases in life expectancy faced by sponsor	Employee faces the longevity risk of outliving their own savings

Over recent decades, there has been a move from DB to DC plans driven by the plan sponsors' preference for lower financial risk and the fact that DC plans are portable (i.e., they can move with beneficiaries when they change jobs).

Hybrid plans also exist that exhibit features of both DB and DC plans. For example, a cash balance plan involves a sponsor defining contributions to assets, which are then pooled; the sponsor faces some of the investment risk, as per a DB plan.

DB Pension Plan

Stakeholders

The following are stakeholders in a DB pension scheme:

- *Plan sponsors (employers)* must make contributions to plan assets. Poor investment performance will result in sponsors having to make extra contributions to an underfunded plan (i.e., when assets are lower than liabilities).
- *Plan beneficiaries (employees and retirees)* face the ultimate risk that an employer defaults on contributions to plan assets.
- *The investment staff, the investment committee, and/or the board* are directly impacted by the success or failure of the plan.
- *Governments* are stakeholders in that they provide tax incentives for employees to save for retirement, and taxpayers will ultimately face the costs of providing welfare for those that have failed to adequately save for retirement.
- *Shareholders* in the corporate employer are stakeholders since an underfunded plan will cause a balance sheet liability and lower income for the company. It will also lead to higher financial risk, which will likely increase share price volatility.

Liabilities and Investment Horizon

The liabilities of a DB pension plan are the present value of the future benefits promised to plan participants. Employees usually only qualify to receive these benefits after meeting certain requirements called *vesting* conditions—typically a required minimum number of years of service.

The funded status of the plan can be measured using the funded ratio, or vested benefit index:

$$\text{funded ratio} = \text{fair value of plan assets} / \text{PV of DB obligations}$$

The major factors affecting the size of the liability are summarized in Figure 10.3.

Figure 10.3: DB Pension Plan Liability Factors

Factor	Impact of Increase in Factor	Rationale
Service/tenure (years worked)	Increases liability	Benefits are usually linked directly to years of service by the employee.
Salary	Increases liability	Benefits are usually linked to final salary.
Longevity	Increases liability	Plan participants are paid benefits for every year they live in retirement. If they live longer in retirement, they will receive more years of benefits.
Employee turnover	Lowers liability	Higher employee turnover means fewer employees are likely to work the number of years of service required for vesting of benefits.
Additional/matching contributions	Increases liability	Additional/matching contributions usually increases the benefits promised to employees.
Expected investment return	Potentially lowers liability	In some cases, an increase in expected returns increases the discount rate used for liabilities, lowering liabilities.
Discount rate	Lowers liability	A higher discount rate will give a lower present value of benefits, hence a lower liability.

The plan beneficiaries can be split into *active lives* (those still employed and earning benefits) and *retired lives* (those receiving benefit payments). The higher the proportion of retired lives in the plan, the shorter the investment horizon of the plan, which lowers the risk tolerance of the plan. Plans that are frozen (i.e., closed to new participants) will also have shorter investment horizons due to the lack of new active lives joining the plan.

Risk Considerations

LOS 10.e: Evaluate risk considerations of private defined benefit (DB) pension plans in relation to 1) plan funded status, 2) sponsor financial strength, 3) interactions between the sponsor's business and the fund's investments, 4) plan design, and 5) workforce characteristics.

Key considerations that drive the risk tolerance of the DB pension plan are summarized in Figure 10.4.

Figure 10.4: DB Pension Plan Risk Considerations

Consideration	Rationale
Plan funded status	Higher funded status potentially increases risk tolerance since the plan will have the ability to absorb short-term losses
Sponsor financial status	Lower debt ratios and higher profitability of sponsor increase risk tolerance since sponsor will have capacity to make contributions in the event of losses in plan assets
Size of plan compared to sponsor	Smaller plans (relative to the size of the sponsor) have greater risk tolerance since the sponsor can tolerate more volatility in contributions should plan assets underperform
Common risk exposures	The lower the correlation of sponsor operating results and the returns of pension assets, the greater the risk tolerance of the plan because the low correlation implies that in times of plan underperformance, the sponsor is likely to be profitable and able to increase plan contributions
Provision for early retirement/ lump-sum distributions	Such plan features generally imply a lower risk tolerance, as the shorter investment horizon means the plan has less time to recover from short-term losses
Workforce characteristics	The younger the workforce and the higher the proportion of active lives, the greater the duration of plan liabilities—increases risk tolerance since the plan has time to recover from short-term losses

**PROFESSOR'S NOTE**

While a general comment about a higher funded status implying a greater ability to take risk is true, it might still be the case that willingness to take risk remains low for the plan. For example, if the plan is in surplus and the sponsor wishes to remain in surplus to minimize contributions to the plan, then minimization of surplus volatility through LDI would be most appropriate. For the exam, make sure you read the information in the question and respond to it in the most appropriate way. In recent years, the factors discussed in Figure 10.4 have been a source of institutional IPS questions in the constructed response questions of the exam.

EXAMPLE: Viewpoint Research Corporation (defined benefit plan)

Viewpoint Research is a leading U.K. producer of polling and survey-based market research. Viewpoint is a relatively new company that has taken advantage of new online methods of collecting research data. Viewpoint's costs are largely related to wages and technological support in the U.K., while revenues are generated from clients across Europe. Five years ago, the company introduced a DB pension plan. All participants of the plan are currently either still working for the company or have left the company for alternative employment. The plan currently has a small deficit. While similar plans often offer early retirement and lump-sum distributions as options to plan participants, Viewpoint's plan does not offer such options.

The company has seen rapid growth in earnings over the previous year, with return on equity being higher than the industry average. The company employs significant

leverage, with a debt-to-assets ratio 50% higher than that of established industry competitors.

Based solely on the information provided, **discuss** two factors that increase the plan's ability to take risk and two factors that decrease the plan's ability to take risk.

Answers:

Two factors that *increase* the plan's ability to take risk are:

1. The plan has zero retired lives, since all participants are either still working for the company or are working in alternative employment. This means the plan liabilities have a relatively long duration; hence, the plan has time to recover from short-term underperformance, which increases the ability of the plan to take risk.
2. The plan does not offer early retirement or lump-sum distribution options to plan participants. This increases the duration and predictability of liabilities, increasing the ability of the plan to take risk since it has time to recover from short-term falls in funded status.

Two factors that *decrease* the plan's ability to take risk are:

1. The company has higher debt levels than the industry average. This lowers the ability of the sponsor to increase contributions to the plan if investment performance is poor, which in turn lowers the risk tolerance of the plan.
2. The plan is running at a deficit. All else equal, this lowers the ability of the plan to take risk since further underperformance of plan liabilities may have a significantly negative impact on the ability of the plan to meet its future liabilities (i.e., make pension payments as required).



PROFESSOR'S NOTE

You may be tempted to simply copy the curriculum and say that the company has a high return on equity and, therefore, has good profitability, which increases the plan's ability to take risk. This is not a good response because this high profitability is stated for the last year only and it has come at a time when the company has high debt levels; hence, it may simply be a reflection of the leverage of the company. There is no guarantee this short-term profitability can be maintained over the long term—the two answers previously given are better answers based on the case facts.

Liquidity Needs

Pension plans must maintain enough liquidity to pay their liabilities (i.e., pension benefits) as they come due. It is important to remember that the liquidity needs of the pension plan are a function of both the benefits being paid to retired lives *and* the sponsor contributions being made to the plan. Liquidity needs are generally *higher* when:

- The proportion of retired lives in the plan is higher, since retired lives are receiving benefit payments. Frozen plans will have higher liquidity needs than nonfrozen plans due to benefits exceeding contributions.

- The workforce of the employer is older, since the time to pay benefits will be shorter.
- The plan has higher funded status, since this will likely lead to lower sponsor contributions and more benefit payments will need to be met from existing plan assets.
- The plan participants have the ability to switch or withdraw from the plan, an event that usually triggers payments to participants.

A plan with lower liquidity needs can generally invest larger amounts in more risky asset classes.

External Constraints

Regulations vary by country; however, there are similar themes in global regulation. Many regulators now require extensive reporting on fees and costs incurred by plans both internally and externally. Personal liability for pension trustees has been increased to ensure they act in the best interests of plan beneficiaries. In Europe, updates to the Institutions for Occupational Retirement Provision (IORP II) Directive is introducing enhanced requirements regarding governance, risk management, and disclosure. In the United States, the Employee Retirement Income Security Act of 1974 (ERISA) regulates investing, funding requirements, and payouts of corporate pension plans. ERISA established the Pension Benefit Guaranty Corporation, a U.S. government agency that protects beneficiaries of terminated plans. The U.S. Pension Protection Act of 2006 established minimum funding ratios for DB plans, and a later revision of the act raised the rates corporations could use to discount their liabilities by using an average high-grade bond yield over 25 years rather than the existing market yield. While this has led to lower liabilities, it may also lead to higher risk taking in order to generate the higher returns needed to maintain funded status, since the value of liabilities will grow at this higher discount rate over time.

From a *tax* perspective, rules once again vary by country; however, pension funds are often treated favorably by governments in order to encourage individuals to save for retirement. Funds that are subject to taxation should consider the tax implications of their investment decisions. For example, lower longer-term capital gains tax rates may incentivize lower turnover strategies. Higher tax rates on profits from derivatives versus rates of returns from the underlying securities may preclude the use of derivatives. When investing internationally, funds should be aware of when and how to benefit from double-taxation treaties between countries, which may offer domestic tax credits when withholding taxes are suffered in foreign markets.

Accounting rules, again, differ by country. In the United States, corporate DB pension plans must follow GAAP, particularly Accounting Standards Codification (ASC) 715, Compensation—Retirement Benefits, which requires that funded status be shown as an asset or liability on the balance sheet. Public pension plans must follow Governmental Accounting Standards Board (GASB) rules, which require assets to be reported at market values and liabilities to be reported using a blended approach. The blended approach for liabilities uses the expected return on plan assets as the discount rate for the funded portion of the liability, and a lower discount rate—the yield on tax-exempt municipal bonds—for the unfunded portion. Using a higher discount rate for the funded

liabilities could incentivize plans to take more risk in order to maintain the funded status of the plan over time.



PROFESSOR'S NOTE

The focus on the exam is on portfolio management rather than a forensic discussion of regulations, taxation, and accounting. Take away the broad points here and be led by the case study in the question in the exam. If there is a significant external constraint that needs to be addressed, it will be referenced in the case.

Investment Objectives

For DB pension plans, the primary objective is to achieve a target return over a specified long-term horizon, while assuming a level of risk that is consistent with meeting its contractual liabilities. A secondary objective could be to minimize (in present value terms) the cash contributions the sponsor will be required to provide.

The target return of the plan should reflect the fact that plan assets need to grow through contributions and investment returns in line with the growth in liabilities of the plan (i.e., the discount rate applied to these liabilities). If a plan is in deficit, then plan assets need to grow faster than the liabilities—how much of this growth in plan assets comes from investment return and how much comes from extra contributions by the company is driven by the plan's ability to take risk and the sponsor's ability to make further contributions to the plan.

DC Pension Plan

Stakeholders

The stakeholders in a DC pension scheme include the following:

- *Plan sponsors (employers)*, while not facing the investment risk or longevity risk of the assets, retain important fiduciary responsibilities. These include contributing to the plan, overseeing the investment of plan assets, and offering suitable investment options to plan participants.
- *Plan beneficiaries (employees and retirees)* face the investment risk of contributions and investment returns not meeting retirement needs. They also face the longevity risk of living longer than expected and outliving their savings.
- *The board* must communicate with participants to keep them well informed, and these communications must consider the participants' level of sophistication. The board may be required to select a default investment option when participants are *disengaged* (i.e., do not make an explicit investment choice with their contributions).
- *Governments* are stakeholders in that they provide tax incentives for employees to save for retirement, and taxpayers will ultimately face the costs of providing welfare for those that have failed to adequately save for retirement.

Liabilities and Investment Horizon

The liabilities of a DC plan sponsor are the required contributions to plan assets; hence, unlike under a DB scheme, there is no liability associated with future benefits. Through

pooling and increased scale, the DC plan may invest in alternative investments not usually available directly to retail investors. The DC plan sponsor bears the liquidity risk of any event that causes participants to exit the plan.

Individuals in a DC plan have an investment horizon linked to their age—older participants will have a shorter investment horizon because they will be retiring and drawing benefits sooner. Many DC plans offer a default *life-cycle option* (also called *target date option*) where asset mix is managed according to a desired retirement date. These life-cycle options can be either **participant-switching options**, which automatically switch members to a more conservative asset allocation as they age, or a **participant/cohort option**, which involves pooling the participant with other investors with a similar retirement date and the fund being managed more conservatively as the retirement date is approached.

Liquidity Needs

The primary drivers of liquidity needs are the age of the workforce and ability of participants to switch or withdraw from the plan. As is the case for DB schemes, if these factors are high, then liquidity needs of the fund will be high.

External Constraints

As per DB schemes, *regulations* vary by country. Regulators typically recognize that many DC plan participants have low levels of understanding about investments; therefore, there is a requirement that plan sponsors educate participants on saving for retirement, particularly with regard to default options for disengaged participants. In Australia and the United States, there is a requirement for the plan to offer a diversified default option for participants. This, however, does not absolve the DC plan trustees of their fiduciary duties to run the plan in the best interests of participants.

From a *tax* perspective, DC plans in the United States (referred to as 401(k) plans) are *tax deferred*. This means participants make pretax contributions and investment earnings are not taxable; however, benefits are taxed as ordinary income. Withdrawals before age 59½ are penalized with an additional 10% tax. A similar tax-deferral system operates in the U.K., with the first 25% of benefits being tax-free.



PROFESSOR'S NOTE

As introduced in the DB section, ERISA in the United States and IORP II in Europe are relevant to both DB and DC plans.

Investment Objectives

The main objective of DC plans is to prudently grow assets to meet spending needs in retirement. As already discussed, there is an onus on the plan sponsor to provide cost-efficient default options for disengaged participants. If the plan offers funds with active management, a secondary objective may be to outperform the passive asset class returns of the default option's strategic asset allocation. In environments where participants can voluntarily switch between competing DC plan providers, outperforming other DC plans may be an investment objective.

Asset Allocation by DB and DC Pension Plans

Aggregate data for both DB and DC plans together show:

- Asset allocation varies by region, largely driven by differences in external constraints, risk appetite, and stakeholder preferences.
- Over the past decade, there has been a rotation from equities into alternative assets and fixed income to try to lower the volatility of funded ratios. Within equities, there is some evidence of home bias to domestic equity markets.



MODULE QUIZ 10.2

1. An increase in which of the following factors will *most likely* lead to a decrease in the liabilities of a DB pension plan?
 - A. Life expectancy.
 - B. Years of service.
 - C. Expected employee turnover.
2. Which of the following changes would *most likely* increase the risk tolerance of a DB pension plan?
 - A. An increase in the average age of the workforce.
 - B. Poor investment performance causing the plan to move from overfunded to underfunded status.
 - C. An increase in allocation to asset classes that have a low correlation with the operating results of the sponsor.

MODULE 10.3: SOVEREIGN WEALTH FUNDS



Video covering this content is available online.

Main Features/Mission

Sovereign wealth funds (SWFs) are investment funds owned by a government. The International Monetary Fund defines five broad categories of SWF, each with different missions:

1. **Budget stabilization funds.** These are set up when a nation's revenues are heavily linked to a natural resource or other cyclical industries to insulate government budgets from commodity price volatility or economic cycles.
2. **Development funds.** This investment prioritizes national socioeconomic projects, usually infrastructure or supporting key industries.
3. **Savings funds.** These funds invest revenues from nonrenewable assets for the benefit of future generations.
4. **Reserve funds.** These are designed to earn returns on excess foreign reserves held by central banks. Typically, foreign exchange reserves held by central banks are low-yielding assets relative to the yields offered by bonds issued by central banks that make up their liabilities. Reserve funds aim to reduce this negative cost of carry through boosting returns on reserves.
5. **Pension reserve funds.** These are used to save and invest to meet future pension liabilities of governments.

Stakeholders

The stakeholders in an SWF are as follows:

- *Current and future citizens* benefit from the fund's success either directly through receiving payments or indirectly through lower taxation or increased investment in the domestic economy.
- *Investment offices* invest SWF assets either directly in-house or appoint external managers.
- *The board* has a fiduciary duty to the ultimate beneficiaries of the fund.
- *Governments* are stakeholders in that they may rely on SWF returns to balance budget deficits.

Liabilities and Investment Horizon, and Liquidity Needs

The liabilities of SWFs are linked to their overall mission and generally are less well defined than other types of institutions. The liabilities and investment horizons of the five broad types of SWFs are listed in Figure 10.5.

Figure 10.5: SWF Liabilities and Time Horizons

SWF Type	Liabilities and Investment Horizon
Budget stabilization	■ Uncertain liabilities linked to commodity prices/cyclical industries ■ Short-term investment horizon because budget support required on a short-term basis
Development	■ Nature of liabilities linked to socioeconomic investments made by the fund ■ Some long-term horizons (e.g., infrastructure), some medium-term horizons (e.g., medical research)
Savings	■ Liabilities are linked to future generations; therefore, long term
Reserve	■ Liabilities are technically the yield promised on bonds issued by governments/central banks; however, funds will target higher returns ■ Investment horizons are very long, typically with no near-term liabilities
Pension reserve	■ Liabilities are linked to future pension payments; therefore, long term ■ Fund may have an <i>accumulation stage</i> in which contributions are made and a <i>decumulation phase</i> where benefits are drawn; time horizon will depend on when these stages occur

Liquidity Needs

- **Budget stabilization funds.** These must maintain the *highest* liquidity level and invest in assets with low risk of significant loss in the short term, in order to meet short-term deficits caused by negative economic- or commodity-related events.
- **Development funds.** Because infrastructure and research and innovation investments are long term, funds established to develop such projects generally have

low liquidity needs.

- **Savings funds.** The main objective is to accumulate wealth for future generations; hence, liquidity needs are *lowest*. Liquidity needs increase as the nation's natural resources become depleted and the government withdraws from the fund to meet budgetary needs.
- **Reserve funds.** Liquidity needs are lower compared to stabilization funds but higher compared to savings funds. Liquid fixed-income securities are usually held that can be readily sold if there is a dramatic change in the reserves of the central bank.
- **Pension reserve funds.** Liquidity needs vary, being lower during the accumulation stage and higher during the decumulation stage.

External Constraints

From a *legal and regulatory* perspective, SWFs are typically established by laws that give the SWF its mission and structure. This may involve clear rules of asset allocation, particularly in the case of a development fund with a specific socioeconomic mission. In order to avoid political influence, high-quality governance, independence, transparency, and accountability are crucial. The Santiago Principles, a best-practices framework established by the International Forum of SWFs (IFSWF), addresses such concerns alongside other key elements expected of a high-quality SWF, such as ethics, risk management, and regular monitoring for compliance with the principles.

SWFs are generally *tax exempt*. This may void the SWF's ability to claim withholding taxes or tax credits that are normally available to taxable investors. Care should be taken when investing internationally to ensure double-taxation treaties exist when subject to withholding taxes abroad. SWFs should take care not to be perceived as using their status to avoid paying taxes in foreign jurisdictions in which they invest.

Figure 10.6: SWF Investment Objectives

SWF Type	Investment Objectives
Budget stabilization	■ Capital preservation ■ Aims to earn returns above inflation with a low probability of losses ■ Should avoid assets correlated with the source of government revenues
Development	■ Support a nation's economic development and increase long-run economic growth ■ Implicit objective is to earn a real rate of return greater than real domestic GDP growth or productivity growth
Savings	■ Maintain purchasing power of the assets over time while making ongoing spending on government budgetary needs
Reserve	■ Earn a rate of return in excess of the yield the government/central bank pays on bonds it has issued
Pension reserve	■ Earn returns to meet future unfunded pension and social care payments promised by the government



PROFESSOR'S NOTE

As will be discussed in the next section, savings funds share very similar objectives to endowments and foundations.

Asset Allocation by Sovereign Wealth Funds

Typical asset allocations differ by type of SWF as follows:

- **Budget stabilization funds.** The majority of fixed income and cash is due to the defensive nature of the fund.
- **Development funds.** These are driven by the socioeconomic mission of the fund (e.g., investment in local infrastructure projects).
- **Savings funds.** A long investment horizon means relatively high allocations toward equities and alternative investments, such as private equity and real assets.
- **Reserve funds.** Allocations are similar to those of savings funds, but with lower allocation to alternatives due to the potentially higher liquidity needs.
- **Pension reserve funds.** These have high allocations to equities and alternatives due to a long investment horizon and low liquidity needs in the accumulation phase.

As mentioned, savings funds and pension reserve funds typically follow the endowment model. Some may also adopt the Canadian model. Another general theme that drives asset allocation is fewer constraints leading to a broader investment mandate and longer time horizons than most institutional investors (e.g., pension funds) allowing for a higher allocation to alternative assets.



MODULE QUIZ 10.3

1. A strategic asset allocation of 10% equities, 60% fixed income, and 30% cash is *most appropriate* for which type of SWF?
 - A. Savings funds.
 - B. Development funds.
 - C. Budget stabilization funds.
2. To boost its foreign currency (FX) reserves, the Bank of Canada (BoC) buys USD currency from domestic Canadian exporters that received USD for their export products. In the context of reserve funds, which of the following statements is *most accurate*?
 - A. The BoC's excess FX reserves are invested in riskier, higher yielding assets.
 - B. The BoC's financing of its purchase of USD can cause deflationary pressures.
 - C. The BoC's issuance of monetary stabilization bonds result in a positive carry.

MODULE 10.4: UNIVERSITY ENDOWMENTS AND PRIVATE FOUNDATIONS



Video covering this content is available online.

While university endowments and private foundations have many similarities in their investment policies, they also have some key differences. We will consider these institutions individually, beginning with university endowments.

University Endowments

Main Features/Mission

University endowments are funds set up by gifts and donations, which are invested to earn returns that provide ongoing support to the university's operating budget. The main objective is to balance the needs of the university today against its needs in the future (i.e., to provide intergenerational equity).

One of the largest endowments is that of Harvard University with assets in excess of \$30 billion in 2016.

Stakeholders

The stakeholders of a university endowment are current and future students, alumni who contribute gifts and donations, and university employees whose livelihoods depend on the university. Stakeholders often have representation on the endowment's board or investment committee, such as alumni who may be investment professionals.

Liabilities and Investment Horizon

The need to maintain intergenerational equity and the unlimited life of the university mean endowments have a *perpetual* investment horizon.

The endowment's liabilities are the future payouts promised to the university, presented in an official spending policy. The endowment's spending policy should ensure intergenerational equity while smoothing payouts to insulate the university from market volatility. To achieve this, the dollar amount of spending each year can be stated as a weighted average of the previous year's spending (adjusted for inflation) and a spending rate (usually between 4% and 6%) applied to a moving average of assets under management (AUM). This can be formulated as:

$$\text{spending}_{t+1} = w \times [\text{spending}_t \times (1 + \text{inflation})] + \{(1 - w) \times (\text{spending rate} \times \text{average AUM})\}$$

where:

w = weight of the prior year's spending amount

Three different types of spending policies result from different values of w :

1. **Constant growth rule ($w = 1$).** The endowment provides a fixed (real) annual payout to the university once adjusted for inflation by the Higher Education Price Index (HEPI). While this method gives more certainty to the university of the payouts that will be received, this means the percentage of endowment value paid out periodically will fluctuate with the endowment value. This spending rule often contains caps and floors representing maximum and minimum percentage values of AUM over one or three years that can be paid out in any period.
2. **Market value rule ($w = 0$).** Annual payouts are a prespecified percentage (the *spending rate*, usually between 4% and 6%) of the three-to-five-year moving average of asset values. Payouts under this method are procyclical in that spending will fluctuate in line with the moving average of asset values.
3. **Hybrid rule ($0 < w < 1$).** Spending is a weighted average of the previous two rules.

Other liability-related factors that need to be considered are as follows:

- **Fundraising from donors.** Gifts and donations coming into the endowment mean that the net spending rate is closer to 2% to 4% of assets rather than the 4% to 6% spending rate applied.
- **Reliance of the university on the spending from the endowment.** All else equal, if the endowment spending comprises a larger proportion of the university's operating budget, then the risk tolerance of the endowment is lower.
- **Capability of the endowment or university to issue debt.** Access to debt markets increases the risk tolerance of the endowment because the institution can borrow to meet spending in times of poor investment performance.

Liquidity Needs

As noted previously, the endowment's annual spending net of gifts and donations is usually very low (around 2% to 4% of assets). Low liquidity needs plus the perpetual time horizon mean endowments usually have a high risk tolerance and absorb relatively high volatility in the short term in pursuit of longer-term returns.

External Constraints

From a *legal and regulatory* perspective, regulation varies by jurisdiction; however, endowments are typically subject to laws that require:

1. Investment on a total return basis (i.e., earning returns from both income and capital gains, not simply generating spending through income returns) and diversification according to modern portfolio theory (MPT).
2. Investment committees or boards and staff who have a fiduciary duty of care in overseeing investments.

In the United States, the Uniform Prudent Management of Institutional Funds Act 2006 (UPMIFA) allows flexibility in spending decisions and enforces the adoption of MPT. In the U.K., the Trustee Act (2000) plays a similar role (relevant to endowments since they are often structured as trusts in the U.K.). The shift to MPT principles has allowed endowments to allocate to a broad range of asset classes.



PROFESSOR'S NOTE

UPMIFA and the Trustee Act also apply to private foundations as discussed in the next section.

Endowments typically have *tax-exempt* status when generating investment returns. Universities are not typically taxed on payouts from the endowment, and donors to endowments usually can deduct gifts from their taxable income.

Investment Objectives

The investment objective is to preserve the purchasing power of the assets in perpetuity (i.e., grow in line with inflation) while achieving returns adequate to maintain the level of spending. As discussed previously, spending policy can be formulated in different ways; however, a typical spending rate target is 5% of average assets.

In practice, this means the university endowment has a primary objective to generate a real return (i.e., after inflation measured using the HEPI) of about 5% on average over a three-to-five-year period. A reasonable volatility limit is typically 10% to 15%. There may be a secondary objective of outperforming a passive benchmark or even a tertiary objective of outperforming a peer group of similar endowments. An issue with the objective of outperforming a peer group is that it may lead to decisions becoming dislocated from the core mission of funding unique liabilities and may lead to *herding* by investment managers into similar investments.

Given endowments need to beat inflation, they tend to have a significant allocation to real assets with expected returns that meet or beat inflation. One lesson from the 2007–2009 financial crisis is that the *liquidity risk* of endowments' portfolios should be analyzed with detailed cash flow modeling. Some endowments use a *liquidity risk band* representing an upper bound for the fund's exposure to illiquid investments, including the endowment's uncalled commitments in illiquid alternative asset funds.

Asset Allocation by University Endowments

Most large U.S. university endowments follow the endowment model, which involves a majority (>50%) allocation to alternative investments, an allocation that has increased over the past two decades. Smaller U.S. university endowments tend to allocate less to alternatives and more to domestic equities and fixed income, with some evidence of home bias causing U.S. equities to be overweighted in these portfolios relative to non-U.S. equities.

EXAMPLE: The Capital University endowment

The Capital University endowment supports 10% of the university's operating budget. The investment office of the endowment is relatively small, and the endowment has an annual spending policy to pay out 4% of the five-year average asset value to the university.

The endowment has historically allocated 30% to public U.S. equities and 70% of the portfolio to fixed income. The board has historically set the objective that annualized volatility should be no more than 15%, and this is not expected to change. A recent review of the endowment's investment policy yielded the following assumptions for expected asset class returns and recommended strategic asset allocation for the endowment:

Asset Class	10-Year Nominal Expected Return	Recommended Strategic Asset Allocation
Fixed income	3%	25%
U.S. equities	6%	35%
International equities	7%	20%
Real estate	8%	10%
Private equity	10%	10%

Expected consumer price inflation over the next 10 years is 1% per year. Higher education price inflation, as measured by the HEPI, is expected to be 100 basis

points per year above consumer price inflation.

1. **Formulate** the investment objectives for the Capital University endowment's IPS. **Calculate** the nominal required return of the endowment that is consistent with this objective.
2. **Discuss** whether the recommended shift in strategic asset allocation weights should be accepted based on the expected return.
3. **Discuss** one factor that could make the recommended strategic asset allocation inappropriate for the endowment.

Answers:

1. The mission of the Capital University endowment is to maintain the purchasing power of the endowment's assets while financing 10% of the operating budget of the university in perpetuity. The nominal required return consistent with this object is a return that meets the spending rate of 4% plus the relevant rate of inflation, namely the HEPI, which is expected to be 1% + 100 basis points = 2%. Hence, the nominal required return of the endowment is 4% + 2% = 6%. The annual volatility of returns should not exceed 15%.

2. Based on expected return alone, the recommended strategic asset allocation weights should be accepted since the current asset allocation fails to meet the nominal required return objective, but the new asset allocation does meet the objective.

The current asset allocation is expected to earn a nominal return of $(0.3 \times 6\%) + (0.7 \times 3\%) = 3.9\%$. This falls far short of the required nominal return of 6%.

The new asset allocation is expected to earn a nominal return of:

$$(0.25 \times 3\%) + (0.35 \times 6\%) + (0.2 \times 7\%) + (0.1 \times 8\%) + (0.1 \times 10\%) = 6.05\%$$

This meets the nominal required return objective of 6%.

3. Concerns regarding the new strategic asset allocation include the following:
 - The current investment office is described as small and appears to have no experience investing in alternative assets. The board should ensure that the investment staff have the skills, experience, and contacts to perform due diligence on the new asset classes—in particular, the alternative investment allocations to private equity and real assets.
 - The new strategic asset allocation must adhere to the risk objective of a maximum annual volatility of 15%. The investment staff should analyze whether the new asset allocation is going to meet this objective.

Private Foundations

Main Features/Mission

Foundations are nonprofit institutions set up to make grants to support specified charitable causes.

The focus of this reading is on *private* foundations set up by individual donors and their families, an example of which is the Bill & Melinda Gates Foundation, with focuses on global health and poverty. Foundations can also be *community* foundations set up by and for the good of the local community, *operating* foundations set up to fund a specific not-for-profit business, or *corporate* foundations set up from the profits of an existing company.

The main objective of private foundations is typically to maintain purchasing power in perpetuity and earn returns sufficient to support the grant-making activities of the foundation (similar to a university endowment's objective).

Stakeholders

The stakeholders of a private foundation may include the founding family, donors to the foundation, recipients of grants from the foundation, and the wider community that the foundation's activities may benefit. Intergenerational tensions may exist like those of an endowment where the needs of current recipients and future recipients of spending from the foundation need to be balanced. The government could also be considered a stakeholder due to the favorable tax treatment of foundations.

Board members of foundations are less likely to have professional investment experience than alumni on endowment boards. This difference in experience may result in less rigorous board oversight or greater delegation to investment staff. This may affect the quality of investment decisions, particularly in more sophisticated markets such as alternative investments.

Mission-related investing (also known as *impact investing*) is a technique increasingly adopted by foundations whereby investments are made into projects that promote the foundation's mission. The challenge with such investments is maintaining a sufficient return on assets to meet the foundation's long-term objectives.

Liabilities and Investment Horizon

Foundations typically have an investment horizon that is perpetual. There is a trend toward limited-life foundations that are mandated to spend down assets within a limited time frame of the founder's death, which would shorten the investment horizon.

In the United States, tax laws require private grant-making foundations to pay out *a minimum of 5% of assets (on a 12-month trailing basis) plus investment expenses*. Foundations must also spend any donations in the year the donation is received (known as flow through).

Unlike universities, which have other sources of revenue outside the spending of their endowment, foundations are relied upon almost exclusively to meet budgets. This, along with the higher liquidity requirements of foundations, means they typically have a lower risk tolerance than university endowments.

Liquidity Needs

As mentioned previously, U.S. foundations are legally required to spend 5% of assets. Foundations should maintain sufficient liquidity to meet near-term spending, capital

calls from private limited partnership fund investments, and any margin calls on derivatives employed by the investment portfolio.

External Constraints

From a *legal and regulatory* perspective, foundations are subject to similar laws, such as UPMIFA in the United States and the Trustee Act in the U.K., which demand investment on a total return basis, diversification, and a duty of care from the board and investment staff.

Foundations typically have similar *tax-exempt* status to endowments, but this status depends on the minimum spending rules mentioned in the previous section. Failing to meet the spending requirement results in a 30% tax on undistributed income. Most U.S. foundations are also subject to a 2% tax on net investment income.

Investment Objectives

The investment objective is to generate a real return over consumer price inflation of the spending rate (minimum 5%) plus investment expenses, with expected annual volatility in a reasonable range (approximately 10% to 15%) over a three-to-five-year period.

There may be a secondary objective of outperforming a policy benchmark based on a tracking error budget.

Asset Allocation by Private Foundations

As mentioned, foundations have a lower risk tolerance than university endowments due to higher liquidity requirements and the heavy reliance on the foundation's spending. However, their overall risk tolerance remains high and, with a long-term objective of beating inflation, larger U.S. foundations allocate about half of the portfolio to alternative investments. Smaller foundations tend to have a higher allocation to domestic equities and fixed-income securities.



MODULE QUIZ 10.4

1. A university endowment has an annual spending policy of 5% of the three-year rolling asset value. Consumer price inflation is expected to be 3% per annum, while the Higher Education Price Index (HEPI) is expected to be 2.5% per annum. The investment objective of the endowment should be to achieve a total real rate of return of at least:
 - A. 5.0%.
 - B. 7.5%.
 - C. 8.0%.

MODULE 10.5: BANKS AND INSURERS

Banks and insurers are different from other institutions in that they are financial intermediaries that are run *for profit*. Remember throughout this discussion that we are advising the institution on *its investment portfolio*, not on its core business of being a bank or an insurance company (however, as we shall see, these two activities are interlinked with each other).



Video covering this content is available online.

Banks

Main Features/Mission

The primary function of a bank is to earn profits by taking deposits from savers and making loans to borrowers. Other functions carried out by a bank are safeguarding assets, executing transactions in securities and derivatives, and advising and investing in securities.

Stakeholders

Most major large international banks are publicly listed, making shareholders a key external stakeholder with an interest in maximization of profits. Customers of a bank, such as depositors and borrowers, are also key external stakeholders. Depositors expect the bank to protect their assets over time, and they make up a majority of the liabilities of the bank. Retail borrowers rely on the bank to finance home purchases, and commercial borrowers rely on the bank to fund their operations. These loans make up a majority of the assets of the bank. Other external stakeholders include creditors, credit rating agencies, regulators, and communities where the bank operates.

Internal stakeholders include the bank's employees, managers, and directors.

Liabilities and Investment Horizon

Deposits constitute the majority of a bank's liabilities. This includes *demand deposits*—which can be withdrawn without notice and are therefore deemed short term in duration—and *time/term deposits* that require advance notice before withdrawal.

Other liabilities include short-term wholesale funding from other financial institutions, long-term debt, and trading/securities payables and repo finance payables.

The majority of the assets of a bank are comprised of longer-term illiquid mortgage and commercial loans.

The investment horizon for a bank portfolio is influenced by the difference between the long-term illiquid assets and the short-term liquid liabilities of the bank. Although banks are perpetual organizations, the instruments held in the investment portfolio of a bank are likely to be very short in nature, such that the bank can manage the volatility of shareholder capital on a medium- to short-term basis.

Liquidity Needs

With deposits as short-duration liabilities and the potential need to raise liquidity in adverse market conditions, liquidity management is a key focus for banks. Since the 2007–2009 financial crisis, regulations have been introduced that require banks to have sufficiently liquid assets to cover near-term expected cash outflows (liquidity coverage ratios, or LCRs) and to have adequate levels of capital from stable sources (net stable funding ratios, or NSFRs). This has led to the investment portfolios of banks being more liquid and banks relying less on the wholesale interbank funding markets.

Banks lending to commercial markets still tend to use wholesale funding markets more than banks lending to retail markets. Retail banks use a higher level of retail deposits in

their funding, which have lower costs and tend to be more stable than wholesale funds, giving retail banks a better liquidity position than commercial banks.

External Constraints

From a *legal and regulatory* perspective, the risks that a systemic bank failure pose to critical economic functions such as payment processing and extension of credit mean that regulators are intensely focused on capital adequacy, liquidity, and leverage levels.

The main goal of regulators is to make sure that banks have adequate capitalization to absorb losses rather than the losses having to be faced by customers, creditors, or taxpayers. This can be achieved through requiring diversification, asset quality-based reserves, and diverse and stable sources of funding. As seen in the section on liquidity, regulators require that banks maintain LCRs and NSFRs.



PROFESSOR'S NOTE

When considering the impact of investment decisions on required regulatory reserves, you should understand that a quality-based reserves system will require that a bank provide for higher reserves when they hold more risky assets. For example, if a bank switched from less-risky investment-grade bonds to riskier high-yield bonds, the risk-weighted assets of the bank would increase in the eyes of the regulator, and required reserves would consequently be higher.

Economies of scale and the benefits of diversification encourage banks to increase their size, with the largest banks regarded by regulators as *systemically important financial institutions (SIFIs)*. Since the global financial crisis, regulations for these SIFIs have:

- Increased capital required to absorb losses on assets.
- Placed limits on the amount of dividends and share buybacks since these payouts to shareholders effectively increase the leverage of the institution.
- Restricted the ability of subordinated debtholders and preferred shareholders to exert their claims in a bankruptcy, forcing them to bear more of the risk of the bank's activities.
- Restricted the use of derivatives, proprietary trading, and the use of off-balance sheet liabilities and guarantees.

From an *accountancy* perspective, three different accounting systems apply to financial institutions:

1. Standard financial reporting (GAAP or IFRS) is used to communicate results to shareholders. Due to the accruals process of accounting, this provides the smoothest reporting of income.
2. Statutory accounting is utilized by regulators and is comprised of a series of adjustments to make the accounts more conservative—for instance, removing intangible assets from the balance sheet, accelerating certain expenses and costs, and the recognition of reserves against unexpectedly large losses on assets or payments under guarantees.

3. True economic accounting uses market value for all assets and liabilities. This is likely to give the most volatile measure of income.

Banks typically are fully *taxable* entities; hence, they must consider the after-tax returns of their investment programs.

Investment Objectives

The primary objective of a bank's investment portfolio is to manage liquidity and reduce risk mismatches between the bank's noninvestment assets and liabilities.

Banks establish an asset and liability management committee (ALMCo) to oversee investment activities. The ALMCo will set the IPS, monitor performance, and set risk limits regarding market, credit, liquidity, and solvency risks, with the authority to require changes on the asset and liability sides of the balance sheet. Having established these objectives, the investment team sets policy benchmarks, monitors performance, and reports to the bank's management and board.

Insurers

Main Features/Mission

Insurers can be divided into the following two broad categories:

- **Life insurers.** They write insurance relating to whole life or term insurance with fixed payments, variable life insurance (with payouts linked to returns of investment funds chosen by the policyholder), annuity products, health insurance, and universal life insurance (with flexible premiums and benefit payouts).
- **Property and casualty (P&C) insurers.** They write insurance relating to commercial property and liability, home ownership, marine insurance, surety, and legal liabilities.

Stakeholders

Insurers tend to be organized as either publicly listed companies or mutual companies. For publicly listed companies, key external stakeholders are *shareholders* who require long-term maximization of the value of their capital while simultaneously honoring obligations to policyholders. Mutual companies are owned by their *policyholders*, either retaining profits as a surplus against potential losses or distributing them to policyholders through dividends or premium reductions. Other external stakeholders include derivatives counterparties, creditors, regulators, and rating agencies.

For traditional life insurance (including universal life) and fixed annuity policies, life insurers maintain a *general account* to fund the liabilities because the insurer bears the investment risk associated with meeting claims under these contracts. For variable life policies and variable annuities, the insurer operates a *separate account* in which assets are invested according to the investment choices of policyholders. For these policies, the policyholder bears the investment risk.

Internal stakeholders include an insurer's employees, management, and board of directors.

Liabilities and Investment Horizon

Insurance companies manage their investments with a focus on asset and liability management; therefore, the nature of the liabilities is crucial to the investment horizon of the investment portfolio.

Life insurers generally face a long duration liability stream through their contract payouts, although this can vary by product line. Because of this, life insurance companies have historically set investment horizons of 20 to 40 years.

P&C insurers generally face a liability stream with a shorter duration and higher uncertainty because claims are related to unlikely, unpredictable events with high payouts, such as natural disasters.

In a similar way to banks, while the institution has a perpetual time horizon, the nature and timing of policy claims will strongly affect the time horizon of investments held. A key consideration for both life and P&C insurers is the frequently occurring underwriting cycle, which causes fluctuations in profitability driven by changes in the level of competition at different points of the insurance business cycle. For example, at times of intense competition and low profits from underwriting insurance contracts, insurers will be inclined to bear less underwriting risk, which may increase their appetite for investment risk, all else equal.

Liquidity Needs

An insurer needs to manage both *internal* liquidity (cash from operations and investing activities) and *external* liquidity (ability to borrow in debt markets). Liquidity needs are affected by the level of interest rates. In times of high interest rates, policyholders with historically low-yielding contracts may surrender (i.e., cash in) their policies in order to invest at higher yields in other investments, thereby increasing the net cash outflows of the life insurer.

As noted previously, P&C insurers face significant cash flow uncertainty due to the nature of their liabilities; hence, portfolios require the ample liquidity of high proportions of cash or cash equivalents and short-term fixed-income securities.

Insurers divide general account investments into two major components: the *reserve* portfolio and the *surplus* portfolio. Regulations require the insurer to maintain a reserve portfolio capable of meeting policy liabilities, and this is therefore managed conservatively. The surplus portfolio is used to generate higher returns, often by assuming liquidity risk and allocating to alternative investments.

External Constraints

From a *legal and regulatory* perspective, insurers, like banks, carry out crucial financial intermediary roles and can become large enough to be classified by regulators as SIFIs. Similar to banks, regulators will aim to ensure that insurers have sufficient capital to absorb losses in the business and losses from investments.

In the United States, the *National Association of Insurance Commissioners (NAIC)* is an association of state regulators that set accounting and reporting policies. In Europe, *Solvency II* is a framework being used to standardize regulation across member states.

From an *accountancy* perspective, standard financial reporting, statutory reporting, and true economic accounting rules apply to insurers just as they do to banks.

Insurers typically are fully *taxable* entities and must run their investment programs with consideration of after-tax returns.



PROFESSOR'S NOTE

The high-level discussion of regulation, accountancy, and tax in the section on external constraints for banks is also relevant to insurers. Once again, keep in mind that a switch into riskier investments will increase the regulatory required reserves of the institution.

Investment Objectives

Similar to banks, the primary objective of an insurer's *investment* portfolio is to manage liquidity and reduce risk mismatches between the institution's assets and liabilities. This process must therefore consider the general business conditions of the insurer and the expected external economic conditions.

The investment oversight function of an insurer is typically carried out by a board committee that is responsible for all investment policies and procedures and reports to regulators and external stakeholders.

MODULE 10.6: BANKS AND INSURERS; BALANCE SHEET MANAGEMENT AND INVESTMENT CONSIDERATIONS



Video covering
this content is
available online.

LOS 10.h: Describe considerations affecting the balance sheet management of banks and insurers.

For both banks and insurance companies, the primary overall objective of the company is to maximize the market value of the institution's equity capital with a high level of assurance that the claims of depositors, creditors, and policyholders can be met.

An expression that captures how changes in the market value of assets, liabilities, and leverage levels affect the change in the market value of equity is:

$$\% \Delta E = \% \Delta A(M) - \% \Delta L(M - 1)$$

where:

$\% \Delta E$ = percentage change in the value of equity

$\% \Delta A$ = percentage change in the value of assets

$\% \Delta L$ = percentage change in the value of liabilities

M = leverage multiplier, A / E



PROFESSOR'S NOTE

This equation makes intuitive sense—the first term on the right-hand side (A) reflects how asset returns are magnified by the leverage (M) used by the firm. The second term relates to the liabilities of the company—the negative sign reflects the fact that increases in liabilities cause equity levels to fall, all else equal. The $M - 1$ term represents the size of liabilities relative to equity. For

example, $M = 4$ means that for every \$4 of assets, the company has \$1 of equity. Since assets are funded by equity and liabilities, liabilities must be \$3 (i.e., $M - 1$).

EXAMPLE: Percentage change in the value of equity

A bank has an equity-to-assets ratio of 5%. **Calculate** the estimated percentage change in the market value of equity if liabilities rise by 1.5% and assets remain stable.

Answer:

With an equity-to-assets ratio of 5%, this means the bank has a leverage multiplier M of $1 / 0.05 = 20$.

If liabilities rise by 1.5% and assets do not change, then using the equation, the percentage change in the market value of equity is estimated to be:

$$\% \Delta E = (0\% \times 20) - (1.5\% \times 19) = -28.5\%$$

The previous equation can be tweaked slightly to assess the sensitivity of the institution's equity capital to a unit change in the reference yield, y , of the assets (i.e., the modified *duration* of the equity capital). This equation is:

$$D_E = D_A(M) - D_L(M - 1) \left(\frac{\Delta i}{\Delta y} \right)$$

where:

D_E = modified duration of the institution's equity capital

D_A = modified duration of the institution's assets

D_L = modified duration of the institution's liabilities

M = leverage multiplier, A / E

$\frac{\Delta i}{\Delta y}$ = estimated change in yield of liabilities, i , relative to a unit change in yield of assets, y



PROFESSOR'S NOTE

Recall that modified duration measures the percentage change in the value of an asset or liability versus a 1% change in yield. This formula is analogous to the previous formula—the only extra term is the $\frac{\Delta i}{\Delta y}$ term, which reflects the expected movement in the yield of liabilities (i) relative to the expected move in the yield of assets (y). The measures of M and $M - 1$ are playing exactly the same role as in the previous equation.

EXAMPLE: Computing duration for life insurer

WellLife Holdings is a life insurer with equity capital to financial assets of 12.5%. In a recent report to the board by the investment committee, the duration of assets was listed as 3, with the duration of liabilities listed as 2. It is also estimated that the yield on the liabilities of the insurer is likely to move by 70 basis points for every 1% move in the yield of the asset portfolio.

1. **Calculate** the duration of the insurer's shareholder capital.
2. **Estimate** the impact of a 25-basis-point fall on the value of shareholder capital in yields of the asset portfolio.
3. Management of the insurer is considering changing the ratio of equity-to-assets to 10%. Assuming all else stays the same, **discuss** the resulting impact on the duration of shareholder capital.

Answers:

1. If equity-to-assets is 12.5%, then the leverage multiplier $M = 1 / 0.125 = 8x$. As per the information in the question, $D_A = 3$, $D_L = 2$, and $\frac{\Delta i}{\Delta y} = 0.70$.

The modified duration of shareholders' equity is therefore calculated as:

$$D_E = (3 \times 8) - (2 \times 7 \times 0.70) = 14.2$$

2. A modified duration of 14.2 implies that a 1% change in the level of yield of the asset portfolio will lead to approximately a 14.2% change in the value of equity. Hence, if the yield of the asset portfolio falls by 25 basis points, then the value of equity will increase by approximately $0.25 \times 14.2 = 3.55\%$.
3. An equity-to-assets ratio of 10% implies a leverage multiplier, M , of $1 / 0.1 = 10x$. If all other variables stay the same, then the new modified duration of shareholders' equity will be:

$$D_E = (3 \times 10) - (2 \times 9 \times 0.70) = 17.4$$

This framework can be extended to consider the expected volatility (i.e., standard deviation) of the percentage changes in the market value of equity capital using the following formula:

$$\sigma_E^2 = M^2 \sigma_A^2 + (M - 1)^2 \sigma_L^2 - 2(M)(M - 1) \sigma_A \sigma_L \rho_{AL}$$

where:

σ_E = standard deviation of percentage change in the market value of equity

σ_A = standard deviation of percentage change in the value of assets

σ_L = standard deviation of percentage change in the value of liabilities

M = leverage multiplier, A / E

ρ_{AL} = correlation of percentage value changes in assets and liabilities



PROFESSOR'S NOTE

Recall the two-asset variance formula that has been used many times over the course of the CFA curriculum—namely when combining Assets 1 and 2 with weights w_1 and w_2 , standard deviations σ_1 and σ_2 , and correlation ρ_{12} . The resulting variance of the portfolio is given by:

$$\sigma_{1+2}^2 = w_1^2 \sigma_1^2 + w_2^2 \sigma_2^2 + 2w_1 w_2 \sigma_1 \sigma_2 \rho_{12}$$

The equation for σ_E^2 is a simple application of this familiar formula to a *portfolio* with a weight, M , in the assets of the institution and a weight of $-(M - 1)$ in the liabilities of the institution.

EXAMPLE: Computing volatility for life insurer

WellLife Holdings maintains a common equity-to-assets ratio of 12.5% and estimates that the annualized volatilities of assets and liabilities are 7% and 4% respectively. The investment committee estimates that the correlation between asset and liability returns is 0.3.

1. **Calculate** the standard deviation of changes in the value of shareholder capital.
2. New regulations are being introduced that will force WellLife to increase its equity-to-assets ratio to 20% and lower the volatility of its assets to 5%.

Calculate the expected volatility of shareholder capital after the new regulations come into force, assuming all else stays the same.

Answers:

1. The leverage multiplier is $1 / 0.125 = 8x$. With $\sigma_A = 0.07$, $\sigma_L = 0.04$, and $\rho_{AL} = 0.3$, the variance of shareholders' equity is given by:

$$\begin{aligned}\sigma_E^2 &= (8^2 \times 0.07^2) + (7^2 \times 0.04^2) - (2 \times 8 \times 7 \times 0.07 \times 0.04 \times 0.3) \\ &= 0.298\end{aligned}$$

The standard deviation of shareholders' equity is therefore $\sqrt{0.298} = 0.546$, or 54.6%.

2. The new leverage multiplier is $1 / 0.2 = 5x$. Using a new figure of $\sigma_A = 0.05$, the variance of shareholders' equity is given by:

$$\begin{aligned}\sigma_E^2 &= (5^2 \times 0.05^2) + (4^2 \times 0.04^2) - (2 \times 5 \times 4 \times 0.05 \times 0.04 \times 0.3) \\ &= 0.0641\end{aligned}$$

The standard deviation of shareholders' equity is therefore $\sqrt{0.0641} = 0.253$, or 25.3%.

There are many strategies that the management of a bank or an insurance company can use to change the factors driving the volatility of shareholders' equity. These strategies could relate to the investment portfolio assets or the nature of the liabilities created by the operations of the company. A summary of these strategies is displayed in Figure 10.7.

Figure 10.7: Strategies for Changing Volatility

Strategy	Impact on Factor	Impact on σ_E	Comments
Hold diversified fixed-income investments	Lowers σ_A	Falls	Diversified fixed income has a lower standard deviation than other riskier asset classes.
Hold high-quality fixed-income investments	Lowers σ_A	Falls	There's a lower chance of significant loss in asset value.
Maintain similar asset and liability durations, and match asset/liability exposure to borrower and claimant options	Increases ρ_{AL}	Falls	Regulators penalize institutions with high asset/liability mismatches.
Hold common stock investments	Increases σ_A Lowers ρ_{AL}	Rises	Most regulators require reserves of 100% to be held against investments in common stock.
Derivatives transparency and collateralization	Lowers σ_A and σ_L Increases ρ_{AL}	Falls	The more understood and protected against counterparty default the institution is, the less chance there is of unexpected losses.
Hold more liquid portfolio investments	Lowers σ_A	Falls	
Surrender penalties for insurance contracts	Lowers σ_L	Falls	Penalties cushion losses when policyholders cash in after interest rates have risen.
Prepayment penalties on debt investments	Increases ρ_{AL}	Falls	Prepayments will occur in a low interest rate environment. Penalties on prepayments help offset rising liabilities in a falling rate environment.
Catastrophic insurance risk	Increases σ_L	Rises	Such losses are large and unpredictable and will cause regulators to demand higher reserves, investment in more liquid assets, and more robust reinsurance agreements.
Predictability of underwriting losses	Decreases σ_L	Falls	Total insurance liabilities are less uncertain.
Diversifying insurance business	Decreases σ_L	Falls	Total insurance liabilities are less uncertain.
Variable annuities	Increases ρ_{AL}	Falls	Asset investment gains and losses are passed through to policyholders due to the nature of the contract.

Asset Allocation for Banks and Insurers

In the case of banks and insurers, optimal investment management simultaneously focuses on the investment portfolio and the liabilities of the business, all within the

context of external economic conditions and regulatory reserve requirements. The investment manager also needs to be conscious of the factors that affect the volatility of shareholders' equity and optimal levels of leverage as discussed previously.



PROFESSOR'S NOTE

While it might seem daunting that so many factors need to be considered when drafting an investment policy for banks and insurers, keep in mind that exam questions are likely to be focused on a particular scenario. Often, a basic knowledge of duration, credit risk, and liquidity of fixed-income securities—as well as the impact a change in these factors will most likely have on earnings, volatility of shareholder capital, and regulatory required reserves—is enough to answer the case study–related questions in the curriculum, as evidenced by the next example.

EXAMPLE: Switching to riskier investments

The ALMCo of SJT Bank recently conducted a quarterly review of business and investment conditions. The main findings are as follows:

- There is evidence that current corporate spreads are significantly below historical norms. It is expected that economic conditions are likely to deteriorate with corporate spreads widening.
- The bank expects disruption in the securitization and secondary loan markets to lower the liquidity of the bank's loan book. They also expect that withdrawals from depositors are likely to become larger and less predictable as economic conditions worsen.

As a result of these findings, the investment management team plans to switch a large portion of its investment portfolio from high-yield corporate floating-rate securities into investment-grade fixed-rate government securities. The team also plans to enter a plain vanilla pay-fixed/receive-floating interest rate swap under standard mark-to-market collateral terms with counterparties.

1. **Discuss** how the planned investment switch addresses the two main findings of the quarterly review conducted by the ALMCo.
2. **Discuss** the likely impact of the switch on required regulatory risk-based reserves.
3. **Describe** how the switch, including the swap position, likely affects the asset and liability duration mismatch of the bank.
4. What is the effect on expected earnings and expected volatility of earnings?

Answers:

1. The first finding of the ALMCo states that credit spreads are expected to widen. This will cause high-yield corporate bond prices to fall by more than investment-grade government bond prices. The proposed switch from high-yield corporate bonds to investment-grade government securities will therefore lower the bank's exposure to widening credit spreads.

The second finding of the ALMCo states that the liquidity position of the bank is likely to worsen. Assets in the loan book are expected to become more difficult to

sell, while demands for liquidity from depositors are expected to increase. The investment-grade government bonds are likely to be more liquid than the high-yield corporate bonds; hence, the switch will improve the liquidity position of the investment portfolio of the bank. This should help offset the deterioration in liquidity conditions in the bank's business.

2. The regulatory risk-based capital the company is required to hold is likely to fall. The government securities are investment grade, while the corporate bonds are high yield, or below investment grade, and as such will have higher credit risk than the government securities. Hence, the risk weighting of the government securities is going to be lower than the risk weighting of the corporate bonds. This means the regulator will view the company as having lower risk-weighted assets and, hence, will require it to hold less equity capital.
3. The switch, including the swap, will not affect the duration of the assets of the company. The switch from floating-rate securities to fixed-rate securities increases the duration of the bond portfolio since fixed-rate assets have higher durations than floating-rate assets. However, the pay-fixed/receive-floating swap will create a synthetic liability increasing the duration of the liabilities since the fixed-leg payments made under the swap will have a higher duration than the floating-leg payments received under the swap. If tailored correctly, this increase in liability duration will counterbalance the increase in asset duration, and the asset and liability profile of the bank will remain unchanged.
4. The government securities are likely to have a lower yield than the corporate securities because they do not offer a credit spread. This will lower the earnings of the bank. The volatility of the more liquid investment-grade government securities should also be lower than the volatility of the corporate bonds. This will lower the volatility of changes in the value of shareholders' equity capital.



MODULE QUIZ 10.5, 10.6

1. Capital requirements for banks and insurance companies are typically set with reference to:
 - A. statutory reporting.
 - B. true economic reporting.
 - C. standard financial reporting.
2. SAJ Assurance (SAJ) is a life insurance company that underwrites a diverse range of life assurance and annuity products. The following is an excerpt from the IPS of SAJ:

SAJ splits the firm's general account into two components: the reserve portfolio and the surplus portfolio. The objective of the reserve portfolio is to provide liquidity to pay policyholder claims in the normal course of insurance operations. The objective of the surplus portfolio is to hedge interest rate mismatches that occur between the reserve portfolio and the liabilities of the firm.

This excerpt is *best* described as:

 - A. correct.
 - B. incorrect because it is the separate account of the life insurer that is broken down into the reserve and surplus portfolios, not the general account.
 - C. incorrect with respect to the objective of the surplus portfolio. The surplus portfolio should be run with the objective of taking higher risk in order to earn

higher returns to grow the surplus over the long term.

3. A bank has an equity capital ratio of 20%. Assets are expected to have a standard deviation of 7%, and liabilities are expected to have a standard deviation of 5%. The correlation of assets and liabilities is estimated to be 0.5. The volatility of shareholder capital for the bank is *closest* to:
- A. 9.3%.
 - B. 16.3%.
 - C. 30.4%.

KEY CONCEPTS

LOS 10.a

The five common characteristics of institutional investors are their larger size, long-term investment horizons, regulatory frameworks, governance frameworks, and principal-agent issues.

LOS 10.b

The investment policy statement (IPS) of an institution formally sets out the institution's mission and objectives, liabilities, investment horizon, external constraints (regulatory, accounting, and tax), asset allocation, and rebalancing and reporting policies.

Four common models used in institutional investing are the Norway model, the endowment model, the Canada model, and the liability-driven investing (LDI) model.

LOS 10.c, 10.d, 10.f

The stakeholders and key elements of the IPS for defined benefit (DB) pension plans versus defined contribution (DC) pension plans are described in the following table.

	DB Plan	DC Plan
Stakeholders	Employers, plan beneficiaries, investment staff, investment committee/board, governments, shareholders	Employers, plan beneficiaries, investment staff, investment committee/board, governments
Liabilities	Present value of future benefits promised to plan participants Higher when: ■ Employees work longer ■ Salaries are higher ■ Participants live longer ■ Lower employee turnover leads to higher vesting ■ Discount rate is low	No liability to plan sponsor once required contribution to plan has been met
Investment time horizon	Longer if proportion of active lives is higher	Dependent on the age of participant (longer if younger)
Liquidity needs	Higher with: ■ More retired lives ■ Older workforce ■ Higher funded status (may reduce contributions) ■ Flexibility of participants to switch plans	Higher with: ■ Older workforce ■ Flexibility of participants to switch plans
External constraints	■ Regulations vary by country: IORP II in Europe, ERISA in United States ■ Tax treatment favorable ■ Accounting rules: ASC 715 requires funded status to be shown on balance sheet (U.S. GAAP); public pension plans follow GASB	■ Regulations vary by country: IORP II in Europe, ERISA in United States ■ Sponsor must offer appropriate default option to disengaged participants ■ Plans are tax deferred
Investment objectives	Achieve a long-term target return over a specified horizon with appropriate risk to meet contractual liabilities	Prudently grow assets to meet spending needs in retirement

The stakeholders and key elements of the IPS for the five types of SWFs are described in the following table.

	Budget Stabilization	Development	Savings	Reserve	Pension Reserve
Stakeholders	Country's citizens, the government, external and internal investment management				
Liabilities	Uncertain: linked to commodity prices/ economic cycle	Linked to socioeconomic investments	Spending on future generations	Yield promised on central bank/ government bonds	Future pension payments
Investment time horizon	Short term	Long/medium term depending on investment projects	Long term	Long term	Long term
Liquidity needs	Highest	Generally low	Lowest	Intermediate	Varies: low during accumulation stage, higher during decumulation stage
External constraints	Established by national legislation. Best practice set by IFSWF's Santiago Principles. Generally tax exempt.				
Investment objectives	Capital preservation	Real growth higher than real GDP growth	Maintain real perpetual spending	Grow faster than yield on central bank/ government bonds	Earn returns to meet future unfunded government pension payments

The following table describes the stakeholders and key elements of the IPS for university endowments and private foundations.

	University Endowments	Private Foundations
Stakeholders	Current and future students, alumni, university employees	Founding family, donors, grant recipients, broader community, governments
Liabilities	■ Set by the future spending promised to the university ■ Spending policy should consider: – Ongoing donations – Reliance of university on spending – Ability to issue debt ■ Spending may use a rule that takes a weighted average of last period's spending (adjusted for inflation) and a fixed spending rate applied to average AUM	■ U.S. tax rules require minimum spending of 5% of assets plus investment expenses ■ Must also spend donations in the same year they are received
Investment time horizon	Perpetual	Typically perpetual, but shortened for limited-life foundations
Liquidity needs	■ Spending rate net of donations is very low at 2%–4% of assets	■ Higher than endowments—legally required to spend 5% of assets ■ Reliance on spending by foundation is usually higher than the reliance of a university on endowment spending
External constraints	Typically tax exempt. Regulation varies by jurisdiction but generally requires a total return approach and prudence in investing (UPMIFA in United States, the Trustee Act in the U.K.).	
Investment objectives	Generate a total real return (after inflation measure by the HEPI) of about 5% on a three-to-five-year rolling basis, with reasonable annual volatility in the range of 10%–15%	Generate a real return over consumer price inflation of the spending rate (minimum 5%), plus investment expenses, on a three-to-five-year rolling basis, with reasonable annual volatility in the range of 10%–15%

The stakeholders and key elements of the IPS for banks and insurers are described in the following table.

	Banks	Insurers
Stakeholders	■ External: shareholders, depositors, borrowers, creditors, credit rating agencies, regulators, communities ■ Internal: employees, management, board	■ External: shareholders, policyholders, derivatives counterparties, creditors, regulators, credit rating agencies ■ Internal: employees, management, board
Liabilities	■ Primarily deposits that are short term	■ Life Insurers: long duration contract payouts ■ P&C insurers: shorter and less certain contract payouts
Investment time horizon	While perpetual organizations, investments are run on a short- or medium-term LDI basis.	
Liquidity needs	■ Driven by deposit withdrawals and potential need to raise liquidity in adverse market conditions. ■ Regulators apply liquidity coverage ratios and net stable funding ratios	■ Varies by product line: P&C liquidity needs generally higher than life ■ Liquidity needs will increase in times of high interest rates due to policyholders surrendering in search of high yields elsewhere
External constraints	Highly regulated due to importance to real economy and systemic risk, particularly SIFIs. Main goal of regulators is to ensure the institution holds sufficient risk-based capital to absorb losses. Three different types of accounting systems apply: 1. Standard financial reporting (GAAP or IFRS) 2. Statutory accounting for regulators (more conservative than financial reporting) 3. True economic accounting (marked-to-market) Banks and insurers are fully taxable.	
Investment objectives	Manage liquidity and risk mismatches between the institution's noninvestment assets and liabilities. This needs to be done in the context of the institution's overall profit maximization objective.	

LOS 10.e

The risk tolerance of a defined benefit pension plan is generally higher when:

- Funded status is higher.
- The sponsor has lower debt levels and is more profitable.
- The plan is small relative to the size of the sponsor's business.
- The correlation between the plan assets and the business of the sponsor is low.
- The plan has no provisions for early retirement or lump-sum options.
- The workforce is young and the plan has a high level of active lives.

LOS 10.g

Aggregated data of both DB and DC plans show that asset allocation varies by country due to differences in regulation, tax constraints, investment objectives, risk appetite, and demographics.

Typical asset allocation by SWF type include:

- Budget stabilization funds (mainly bonds and cash).
- Development funds (depends on socioeconomic causes supported).
- Savings and pension reserve funds (higher levels of equities and alternatives).
- Reserve funds (equities, alternatives with significant allocation to bonds).

Typical asset allocation for endowments and private foundations include the following:

- **University endowments.** Large U.S. endowments use the endowment model with a majority allocation to alternatives. Smaller U.S. endowments tend to hold more domestic equities and fixed income, with a lower allocation to alternatives.
- **Private foundations.** Large foundations allocate approximately 50% to alternatives. Smaller foundations allocate more to public equities and fixed income.

LOS 10.h

The change in the market value of equity is given by:

$$\% \Delta E = \% \Delta A(M) - \% \Delta L(M - 1)$$

where:

$\% \Delta E$ = percentage change in the value of equity

$\% \Delta A$ = percentage change in the value of assets

$\% \Delta L$ = percentage change in the value of liabilities

M = leverage multiplier, A / E

The duration of the equity of a bank or insurer is given by:

$$D_E = D_A(M) - D_L(M - 1) \left(\frac{\Delta i}{\Delta y} \right)$$

where:

D_E = modified duration of the institution's equity capital

D_A = modified duration of the institution's assets

D_L = modified duration of the institution's liabilities

M = leverage multiplier, A / E

$\frac{\Delta i}{\Delta y}$ = estimated change in yield of liabilities, i , relative to a unit change in yield of assets, y

The expected volatility (i.e., standard deviation) of the percentage change in the market value of equity capital is given by:

$$\sigma_E^2 = M^2 \sigma_A^2 + (M - 1)^2 \sigma_L^2 - 2(M)(M - 1) \sigma_A \sigma_L \rho_{AL}$$

where:

σ_E = standard deviation of percentage change in the market value of equity

σ_A = standard deviation of percentage change in the value of asset holdings

σ_L = standard deviation of percentage change in the value of liabilities

M = leverage multiplier, A / E

ρ_{AL} = correlation of percentage value changes in assets and liabilities

The volatility of equity of a bank or insurer can be lowered by:

- Reducing the volatility of assets.
- Reducing the volatility of liabilities.

- Lowering leverage.
- Increasing the correlation of assets and liabilities.
- Diversifying assets and liabilities.
- Increasing the liquidity and quality of investment assets.
- Accessing stable funding sources.

ANSWER KEY FOR MODULE QUIZZES

Module Quiz 10.1

1. **A** The first statement is incorrect. Institutional clients are generally larger in scale than individual clients. While this may cause some smaller asset classes or strategies to be inaccessible due to capacity issues, generally, the larger scale of institutional clients opens up more asset classes (e.g., private equity and real estate) that are not generally available to individual investors.

The second statement is correct. Institutional investment programs tend to have more formal governance structures than the investment programs of individual investors, including an investment committee, board, and investment staff. (LOS 10.a)

2. **B** The endowment model is the approach most likely to meet the objectives of the foundation because it involves a large allocation to alternative investments and uses externally managed investment funds that employ active management. The Norway model is inappropriate because it uses largely passive strategies and provides little or no allocation to alternatives. The Canada model is inappropriate because it relies on internally managed assets rather than outsourcing to external managers. (LOS 10.b)

Module Quiz 10.2

1. **C** An increase in expected employee turnover would reduce the expected vesting of benefits with plan participants, since fewer employees are likely to complete minimum service conditions required to become eligible to receive benefits. This will lower the liabilities faced by the pension plan. An increase in years of service would lead to higher liabilities because benefits are usually linked directly to years of service. An increase in the life expectancy of plan participants will increase the liabilities of the plan because benefits are paid in every year of retirement. (LOS 10.c)
2. **C** Allocating to asset classes with returns that have a low correlation with the operating performance of the sponsor increases the plan's ability to take risk because it is more likely that the sponsor will be able to make contributions in times of poor investment performance. The fund moving from overfunded to underfunded status is most likely to lower the risk tolerance of the plan since continued underperformance may jeopardize the ability of the plan to meet future benefit payments. An increase in the average age of the workforce will

shorten the time before benefits need to be paid. This is likely to lower the risk tolerance of the plan assets since there is less time to recover from any short-term poor performance. (LOS 10.e)

Module Quiz 10.3

1. **C** Budget stabilization funds are defensive in nature and are therefore largely fixed income and cash. Development funds would be expected to investment in projects and investments that promote the socioeconomic goals of the fund, while savings funds would allocate a higher weight to alternative investments and equities in order to meet their objective of beating inflation over the long term. (LOS 10.g)

2. **A** A country always needs FX reserves for global trade and for paying its foreign currency debt.

In this example, the BoC invests the USD in very liquid but low yielding U.S. Treasuries. The BoC finances its purchase of USD by printing CAD currency. However, flooding the Canadian market with more CAD currency can cause *inflationary* pressures, therefore, answer choice B is incorrect.

The BoC counters those inflationary pressures by issuing monetary stabilization bonds to “absorb” the excess CAD currency. The stabilization bonds are issued at a higher yield than the yield received from the U.S. Treasury investments. That results in a cost called “negative carry” (e.g., issue debt at higher yield, invest at lower yield), therefore, answer choice C is incorrect.

The BoC periodically determines and updates how much in USD currency it needs in its FX reserves. Excess FX reserves not needed can then be transferred to a reserve fund and invested in riskier, higher yielding assets to offset the negative carry, therefore, answer choice A is correct. (LOS 10.g)

Module Quiz 10.4

1. **A** In order to preserve the purchasing power of the endowment, the real required rate of return (i.e., excluding inflation) should be equal to the spending rate of 5%. Note that the nominal required rate of return would include inflation as measured by the HEPI, totaling $5\% + 2.5\% = 7.5\%$. (LOS 10.g)

Module Quiz 10.5, 10.6

1. **A** Statutory reporting is required by regulators, which involves a series of adjustments to standard financial reporting that remove low-quality assets and accelerate certain expenses in order to set the level of required reserves. (Module 10.5, LOS 10.d)
2. **C** The excerpt is incorrect with regard to the objective of the surplus portfolio. The surplus portfolio represents investment funds of the company in excess of those required to meet the expected claims of policyholders. As such, the usual objective with the surplus portfolio is to take higher risk to earn higher returns in order to grow the surplus, maximize value for shareholders, and remain

competitive as a life insurance company from a pricing perspective. (Module 10.5, LOS 10.f)

3. C The expected variance of the percentage changes in the market value of equity capital is given by:

$$\sigma_E^2 = M^2 \sigma_A^2 + (M - 1)^2 \sigma_L^2 - 2(M)(M - 1)\sigma_A \sigma_L \rho_{AL}$$

where:

σ_E = standard deviation of percentage change in the market value of equity

σ_A = standard deviation of percentage change in the value of assets

σ_L = standard deviation of percentage change in the value of liabilities

M = leverage multiplier, A / E

ρ_{AL} = correlation of percentage value changes in assets and liabilities

In this case, $\sigma_A = 0.07$, $\sigma_L = 0.05$, and $\rho_{AL} = 0.5$. The equity capital ratio of 20% implies that $E / A = 0.20$; hence $A / E = 1 / 0.2 = 5x$. Using the formula:

$$\begin{aligned} \sigma_E^2 &= 5^2(0.07)^2 + (5 - 1)^2(0.05)^2 - 2(5)(5 - 1)(0.07)(0.05)(0.5) \\ &= 0.1225 + 0.04 - 0.07 = 0.0925 \end{aligned}$$

Then, $\sigma_E = \sqrt{0.0925} = 0.304$ or 30.4%. (Module 10.6, LOS 10.g)

READING 11

TRADING COSTS AND ELECTRONIC MARKETS

EXAM FOCUS

This topic review covers issues with trade execution: trading costs, the impact of market innovations on trading costs, execution quality, and finally, regulatory oversight. Candidates should be able to calculate effective spread and volume-weighted average price transaction cost. Some of the material on electronic markets and market microstructure overlaps with the topic review on algorithmic trading in the Portfolio Management pathway. Candidates should become familiar with a lot of terminology in electronic trading, including abusive trading practices.

MODULE 11.1: EXPLICIT AND IMPLICIT TRADING COSTS



Video covering this content is available online.

Evaluation of trade execution should not only consider explicit costs such as brokerage fees but also implicit costs (the focus of this reading), which consist of the price impact cost of an unfavorable execution price and the opportunity costs of failed orders. While explicit costs are observable and transparent, implicit costs are not readily discernible. We will spend the first part of this topic review learning about approaches to estimate these implicit costs.

LOS 11.a: Explain the components of execution costs, including explicit and implicit costs.

Trading Costs

Explicit trading costs include brokerage, taxes, and fees; one would expect to receive a receipt for such costs. For large buy-side traders, explicit trading costs include having a trading staff and related expenses, which tend to be fixed in nature. Smaller traders use brokers and incur variable commissions.

Implicit costs are harder to measure, and include the bid-ask spread, market or price impact costs, opportunity costs, and delay costs (or slippage). They must be estimated by measuring the results of a trade relative to a reference point (i.e., a **benchmark**).

- The **bid-ask spread** is the highest potential cost for a small trade. Trades at the posted bid or ask prices are quickly executed. Patient traders may choose to trade

between the posted bid and ask prices (also known as offer prices), but run the risk of not filling their orders. Larger, liquidity-demanding trades tend to move down the order book and are filled at a higher cost.

- **Market impact** (or **price impact**) is the impact of demanding liquidity in the market (i.e., market-moving trades). If a trader has a large buy (sell) order to execute, the trader would have to increase (lower) prices to attract sellers (buyers). A larger order can be broken into smaller trades to go with the flow of the market and minimize the price impact cost. However, it may increase the delay and opportunity costs (discussed next).
- **Delay cost** (or **slippage**) is the cost of an adverse price movement during the lag in executing a large trade. A trader breaking up a large buy (sell) order risks the price increasing (decreasing) over time and the latter batches being executed at a significantly higher (lower) price.
- **Opportunity cost** arises from unfilled orders or failed trading opportunities. A patient value trader might see that an underpriced security rises in price (i.e., the delay cost). If the resulting higher price forces the trader to cancel the unfilled part of the order, the resulting lost profits are the opportunity cost of the trade.

While the other components of implicit costs look at the difference between actual execution price and the price observed when the order was triggered, opportunity costs look at the cost of lost opportunities on account of unfilled trades. Note that there is a tradeoff between the market impact cost on one hand and the delay plus opportunity cost on the other; while we are patiently waiting for a good price, the market may move out of our trading range.



PROFESSOR'S NOTE

Liquidity-demanding trades are market orders that accept a posted bid or ask price. By contrast, limit orders *provide* liquidity by offering to trade at a posted bid or ask price. Larger, liquidity-demanding trades often “walk down” the limit order book, exhausting the quantity offered in successive limit orders. For example, a buy order for 150,000 shares may hit several limit orders (with posted ask prices) until the cumulative quantity reaches 150,000.

LOS 11.b: Calculate and interpret effective spreads and VWAP transaction cost estimates.

Dealer Quotes

Dealers make the market by offering to buy for, and sell from, their own inventory. Every quote will have a bid price or ask price as well as associated quantity. The **best bid** is the highest-posted bid price and is also known as the **inside bid**. Similarly, the **best ask** or **inside ask** is the lowest ask price. **Inside spread** is the difference between the best ask price and the best bid price. A **midquote** price is the average of the bid and ask price quoted by a single dealer.

A **limit order book** shows the available posted bid and ask prices (offers) with corresponding quantities that the dealer is willing to purchase or sell, respectively. Bids

and offers are sorted from best to worst as shown in Figure 11.1.

Figure 11.1: Limit Order Book for XYZ, Inc., Stock

Bids				Asks			
Dealer	Time Entered	Price	Size	Dealer	Time Entered	Price	Size
P	9:31 am	\$32.25	3,000	R	9:31 am	\$32.29	2,000
Q	9:41 am	\$32.24	2,500	P	9:31 am	\$32.31	3,000
R	9:45 am	\$32.23	3,500	Q	9:41 am	\$32.35	3,500

At 9:31 am, a trader executing a market purchase order for 3,000 shares would purchase 2,000 shares at \$32.29 and the remaining 1,000 shares at \$32.31. Note that the trader had to split the larger order because the inside ask quoted by dealer R was only for 2,000 shares. This resulted in a \$0.02 per share higher cost for part of the order. Larger orders have a price impact as they move down the order book (and, therefore, execute at worse prices). This price impact depends on the size of the order and the relative liquidity in the market. It should be noted that dealer P may revise his quote higher once he sees a trade, resulting in the inside ask of \$32.29 disappearing from the order book. To avoid missing out on the \$32.31 price, a trader may execute the entire trade with dealer P.

A trader may also post her own quote in the form of a **standing limit order**. Standing orders provide liquidity to the market and trade at their posted prices, but at a risk of failure to complete the trade.

In a nonexchange market, absent a clearinghouse guarantee, a trader may choose a dealer other than the one offering the most favorable price. Relationships with dealers and their creditworthiness are factors (other than price) that play a role in choosing the counterparty in such markets.

Types of Benchmarks

The implicit costs of a trade are measured relative to a benchmark; trades at prices better than the benchmark are rated favorably relative to trades that execute at inferior prices. Several benchmarks can be used to evaluate trades, including the effective spread, VWAP, and implementation shortfall.

1. *Effective Spread*

The effective spread transaction cost uses the midquote price as the benchmark price. The difference between the transaction price and the midquote price is the effective spread transaction cost estimate:

Effective spread transaction cost estimate = (side) × (transaction price – midquote price)

where:

side = +1 for buy orders and –1 for sell orders

To compare to the quoted bid-ask spread, we multiply the effective spread transaction cost by 2 to arrive at the effective spread.

effective spread = $2 \times (\text{effective spread transaction cost})$

If the trade occurs at the posted bid or ask prices, the effective spread will be same as the quoted spread. If the trade occurs at a better price, there will be a **price improvement** and the effective spread will be lower than the quoted spread.

EXAMPLE: Spreads

Answer these questions using the information provided in Figure 11.1.

1. Calculate:

- a. The spread quoted by dealer Q.
- b. The inside spread.
- c. The midquote for dealer R.

2. Suppose that a purchase transaction occurred at \$32.29. Using dealer P's quotes only, calculate the effective spread and the quoted spread.

Answer:

1. a. Spread quoted by dealer Q = $32.35 - 32.24 = \$0.11$
 b. Best ask price = \$32.29 and best bid price = \$32.25; inside spread = $32.29 - 32.25 = \$0.04$
 c. Midquote price for dealer R = $(32.23 + 32.29) / 2 = \$32.26$
2. Midquote price for dealer P = $(32.25 + 32.31) / 2 = \$32.28$
 Quoted spread = $32.31 - 32.25 = \$0.06$
 Effective spread = $2 \times (+1) \times (\$32.29 - \$32.28) = \$0.02$
 Since the effective spread is less than the quoted spread, there was a price improvement on that trade.

Limitations of Effective Spread

- When a large order is split into smaller orders, the effective spread is a poor indicator of trade performance because it does not take into account the price impact cost.
- Effective spread also does not account for slippage or delay costs when part of the order does not get filled at desired prices. Delay costs can also occur when the trader does not route the order to the most appropriate market (i.e., one with the desired liquidity). Delay costs are measured for the portion of the order that does not get filled by the end of the trading day.
- Sometimes, the market price will move unfavorably, voiding a trading opportunity. For example, an analyst values a stock at \$12.55, and the current market price of the stock is \$12.15. The analyst then places a purchase order for 10,000 shares with the firm's trading desk. The trader executing the trade splits the order to obtain a favorable price (i.e., to reduce the price impact cost). If the stock price rises beyond the \$12.55 target price, the unfilled part of the order will have to be abandoned. These lost opportunities represent the opportunity cost when an unfilled part of the

order is canceled due to adverse price movements. Effective spread does not capture the opportunity cost of a trade.

2. Volume-Weighted Average Price

Volume-weighted average price (VWAP), also known as the **interval VWAP**, is the weighted average price at which all the trades were executed during the time interval between the order being placed and being executed. VWAP is easy to interpret—it evaluates the price at which an order was executed relative to other trades occurring during the same time period.

To evaluate a trade, the VWAP of the trade is compared to the benchmark VWAP. If the entire order was executed at one price, its VWAP would be that price.

$$\text{VWAP transaction cost} = \text{trade size} \times (\text{side}) \times (\text{trade VWAP} - \text{benchmark VWAP})$$

where:

side = +1 for buy orders and -1 for sell orders

EXAMPLE: VWAP

The following trades are observed for BNC, Inc., stock during the relevant time interval:

- At 10:00 am, 100 shares trade at \$12.11.
- At 11:00 am, 300 shares trade at \$12.00.
- At 11:30 am, 600 shares trade at \$11.75.

Suppose that the subject trade was for the purchase of 300 shares, which was executed as follows:

- 100 shares at \$12.11.
- 200 shares at \$12.00.

1. **Calculate** the benchmark VWAP and trade VWAP for BNC.

2. **Calculate** the VWAP transaction cost.

Answer:

The total number of shares traded during the relevant time interval is 1,000.

$$1. \text{ benchmark VWAP} = (100 / 1,000) \times \$12.11 + (300 / 1,000) \times \$12.00 + (600 / 1,000) \times \$11.75 = \$11.86$$

$$\text{trade VWAP} = (100 / 300) \times \$12.11 + (200 / 300) \times \$12.00 = \$12.04$$

$$2. \text{ VWAP transaction cost} = 300 \times (+1) \times (12.04 - 11.86) = \$54$$

Limitations of VWAP Transaction Cost

- VWAP is not useful if the trade being evaluated is a significant part of the trading volume. In such cases, the benchmark VWAP and the trade VWAP will be close to each other and the measured transaction cost will be skewed toward zero.

- VWAP does not capture the price impact cost. For example, if a large buy order was the only trade that was executed during a time interval at a price above the normal trading price, the benchmark VWAP will then be identical to the trade VWAP and the calculated transaction cost will be zero. However, the trade was not executed at a good price.

This bias toward zero may explain the popularity of VWAP among investment managers seeking to highlight the low transaction cost of their trades.

An improvement over the VWAP transaction cost approach is the implementation shortfall measure as discussed in the next LOS.

LOS 11.c: Describe the implementation shortfall approach to transaction cost measurement.

3. Implementation Shortfall

Implementation shortfall is a conceptual approach that measures transaction costs as the difference between the value of the actual portfolio and the value of a hypothetical **paper portfolio**. In the paper portfolio, the trade is fully executed at no cost, and at the prevailing price (also called the decision price, arrival price, or strike price) when the order was placed. The prevailing price used is generally the midquote price at that time.

Implementation shortfall addresses the shortfalls of VWAP because it measures the total cost of trading by capturing all three implicit costs (i.e., price impact, slippage, and opportunity costs). However, the computation involved is more complex.



MODULE QUIZ 11.1

Use the following information to answer Questions 1 and 2.

Figure 1: Limit Order Book for Sima, Inc., Stock

Bids				Offers			
Dealer	Time Entered	Price	Size	Dealer	Time Entered	Price	Size
Alpha	9:31 am	\$17.65	3,000	Alpha	9:31 am	\$17.69	2,000
Bravo	9:41 am	\$17.63	2,500	Bravo	9:31 am	\$17.71	3,000
Charlie	9:45 am	\$17.62	3,500	Charlie	9:41 am	\$17.75	3,500

1. At 9:31 am, a trade to purchase 4,000 shares was executed at in two lots of 2,000 shares. Using the information in Figure 1, the price impact cost per share of the second lot is *closest* to:
 - A. \$0.01.
 - B. \$0.02.
 - C. \$0.04.
2. Using the information in Figure 1, the inside spread is *closest* to:
 - A. \$0.02.
 - B. \$0.03.

C. \$0.04.

Use the following information to answer Questions 3 through 5.

Figure 2: Trade Data for ABC, Inc., June 15, 2019

-
- At 10:00 am, 1,000 shares trade at \$44.55.
 - At 11:00 am, 3,000 shares trade at \$44.65.
 - At 11:30 am, 6,000 shares trade at \$44.75.
 - During that time interval, a trader purchased 1,000 shares at \$44.65 and 500 shares at \$44.75.
-

3. Using data in Figure 2, the benchmark VWAP is *closest* to:
 - A. \$44.58.
 - B. \$44.62.
 - C. \$44.70.
4. Using data in Figure 2, the trade VWAP is *closest* to:
 - A. \$44.58.
 - B. \$44.68.
 - C. \$44.70.
5. Using data in Figure 2, the VWAP transaction cost is *closest* to:
 - A. (\$30).
 - B. \$25.
 - C. (\$150).
6. The use of VWAP to evaluate execution quality is *most likely* to be appropriate when the:
 - A. objective is to capture the price impact cost of a large trade.
 - B. trade represents a small part of the overall trading volume.
 - C. trade is a significant part of the overall trading volume.
7. Which transaction cost measure captures the price impact, slippage, and opportunity cost of a trade?
 - A. VWAP.
 - B. Bid-offer spread.
 - C. Implementation shortfall.

MODULE 11.2: ELECTRONIC TRADING SYSTEMS



Video covering this content is available online.

LOS 11.d: Describe factors driving the development of electronic trading systems.

The use of information technology in the development of electronic markets has resulted in lower trading costs and improved execution efficiency. Automated electronic systems are used by exchanges and their trader clients to match orders quickly. High-speed order processing and communication systems are needed for traders to implement their trading algorithms, and for the exchanges to process the vast number of orders such systems produce.

Factors driving development of electronic trading systems are:

1. *Cost*: Electronic systems are cheaper to operate as compared to their manual counterparts.
2. *Accuracy*: Electronic systems perform exactly as they are programmed to perform. As such, they precisely enforce the exchange's order precedence and pricing rules.
3. *Audit trails*: Electronic systems generate and maintain records, allowing investigators to examine the precise chain of events that may be of interest to them.
4. *Fraud prevention*: Electronic systems keep hidden orders hidden, and do not leak information inadvertently or fraudulently.
5. *Continuous market*: Electronic systems don't need breaks, operating continuously during trading hours. Electronic trading is also unaffected by severe weather or other events that may hinder human traders from convening on the trading floor.

From the perspective of traders, electronic systems can quickly process vast amounts of data, exhibit perfect discipline (do what they are programmed to do, without any behavioral bias), and maintain perfect records.

While the efficiencies of electronic trading systems have greatly benefited stock traders, bond market trades remain largely over the counter. While many competing electronic exchanges for bond markets exist, they are used primarily by dealers. Significant cost savings would result for public investors if they were given access to these systems by their brokers.

LOS 11.e: Describe market fragmentation.

Market fragmentation occurs when a security trades in multiple markets. There may be significant liquidity differences between these electronic markets. For example, a security may have several posted bids, but only a few offers on one exchange with the opposite situation in another exchange. Fragmentation can lead to significant price and liquidity differences between markets.

Automated trading strategies for large orders seek out liquidity across all markets to minimize the price impact of their trades. Trading algorithms such as smart order routing and liquidity aggregation seek to overcome the challenges posed by market fragmentation. **Liquidity aggregation algorithms** create a "super book" displaying liquidity across all markets. **Smart order routing algorithms** send orders to the markets with the best prices and sizes.

LOS 11.f: Identify and contrast the types of electronic traders.

Electronic trading systems are used by profit-seeking proprietary traders (dealers, arbitrageurs, and front runners), buy-side traders (investment and risk managers), and the brokers that serve them. Electronic proprietary traders include high-frequency traders (i.e., those who make quick round-trip trades thousands of times during the day) and low-latency traders (i.e., those who rely on speed in receiving news and trading on it). **Latency** is defined as the time lapse between the occurrence of an event and the execution of a trade based on that event.

Major types of electronic traders include:

- **Electronic news traders.** These analyze high-speed news feeds and submit market orders (as opposed to limit orders) based on the analysis. News traders often employ artificial intelligence systems to quickly process the news and generate trades based on it so that they can trade against stale orders (i.e., posted limit orders whose prices do not reflect the news). Some news traders also employ natural language processors to read qualitative data to judge the impact of the news on the market price of the stock. Due to low round-trip transaction costs in electronic markets, news traders can make a profit even if their analysis is right only a fraction of the time.
- **Electronic dealers.** These post bid and offer prices to profit from the spread. Dealer profit depends on the frequency with which they trade. Electronic dealers maintain a low inventory of actively traded securities and quickly adjust their positions based on market information. Dealers manage the risk of adverse price movements (e.g., price declines when the dealer has a long position) by quickly taking the opposite side of the trade (e.g., selling the inventory by removing all bids). Electronic dealers often monitor news feeds and suspend their quotes when news is released. This results in lost trading opportunities when the news is immaterial, but protects the dealer from providing liquidity to news traders when the news is material.
- **Electronic arbitrageurs.** These trade in multiple markets seeking to exploit price discrepancies. **Arbitrage portfolios** consist of long and short positions (called **legs**), which minimize the cost and risk to the arbitrageur.
- **Electronic front runners.** These use artificial intelligence to sniff out large trades (or many small trades) on the same side and then use low latency to trade ahead of them. For example, a buy-side trader may break up a large order, seeking to minimize the price impact cost of the trade. Once this activity is unearthed, front runners will seek to trade ahead of the buyer to purchase at the lowest-posted ask prices, pushing the market price higher. Front runners search for patterns in order submissions or relationships between orders and events.
 - *Patterns:* Most jurisdictions forbid dealers and brokers from front running orders that their clients have submitted (because they would be trading on inside information). However, past client records may provide insight into client behavior and thereby enable the dealer or broker to *predict* forthcoming orders. Front runners may also seek out clear patterns in executed trades expecting those patterns to repeat in the future. For example, if a specific order size is executed every five minutes for an hour, the dealer may expect that pattern to repeat when that same pattern starts the next day. Knowing that front runners are always on the lookout for patterns, trading algorithms developed by brokers for their buy-side clients often randomize their trading patterns. However, large trades are difficult to hide—and front runners, with their sophisticated data mining tools, will seek those out.
 - *Events:* Some front runners use observed relationships between events and orders to predict future orders. For example, if there is a distinct pattern of orders following an earnings announcement, front runners can use that knowledge to trade ahead of the anticipated orders.

- **Electronic quote matchers.** Standing limit orders (i.e., limit orders waiting to be filled) provide valuable information to other traders; they disclose the intent of the trader posting the order to buy or sell the specified quantity. Electronic quote matchers use their knowledge of standing orders as valuable *options to trade* while limiting their risk. For example, a quote matcher notices a standing buy order on a stock at \$12.20 and purchases this stock at \$12.25. If the price rises, the quote matcher profits from the upside, while the downside risk is limited to \$0.05 per share due to the available standing buy order.
- **Buy-side traders.** These execute trades on behalf of their portfolio managers and use electronic order management systems (OMSs) to track the orders that portfolio managers have submitted, the orders that are sent to the broker, and the ones that have been already filled. Buy-side traders use **electronic brokers** for trade execution, and these brokers often offer advanced order-processing algorithms and tactics in addition to standard market and limit order processing to their clients.



PROFESSOR'S NOTE

Buy-side traders should not be confused with buy orders; buy-side traders process trades (both buy and sell) generated by their portfolio managers, who manage money for individual and institutional investors.



MODULE QUIZ 11.2

1. Which of the following is *least likely* to be a factor driving the development of electronic trading systems?
 - A. Operating cost.
 - B. Prevention of fraud.
 - C. Market fragmentation.
2. Which of the following statements about electronic trading markets is *least accurate*?
 - A. Electronic trading has mostly facilitated bond trading for retail traders.
 - B. Efficiencies in electronic trading systems have greatly benefited stock traders.
 - C. Electronic markets continue to function even during severe weather.
3. Automated trading strategies seeking out liquidity across markets is *most likely* in response to:
 - A. market fragmentation.
 - B. a reduction in brokerage costs.
 - C. even liquidity across markets.
4. Traders using artificial intelligence to sniff out large trades that are being processed in small parts are *most appropriately* labeled as electronic:
 - A. front runners.
 - B. arbitrageurs.

MODULE 11.3: CHARACTERISTICS AND USES OF ELECTRONIC TRADING SYSTEMS



Video covering this content is available online.

LOS 11.g: Describe characteristics and uses of electronic trading systems.

The Need for Speed

In addition to lower trading costs, electronic trading systems allow low-latency traders a competitive advantage by jumping the order queue. Jumping the order queue may be in order taking (i.e., executing against a standing sell order when positive market news is revealed), market making (taking precedence when providing liquidity) and order canceling when they do not want to fill the order anymore (e.g., when trades at other exchanges make a trader's posted quote ill advised). In other words, electronic traders have to be faster than their competitors to capitalize on market opportunities.

Low-latency traders focus on minimizing the latency involved in three phases of a trade:

1. The time gap between the publication of actionable news and the receipt of that news by the trader.
2. The time gap between the receipt of actionable news and deciding on an appropriate action (i.e., order).
3. The time gap between order determination and communicating that order to the exchange.

Latency due to the first and third components relates to communication speed, while latency due to the second component relates to computing speed.

1. *Communication speed:* Minimizing the distance travelled is the key to minimizing latency associated with communication speed. Traders investing in the latest and fastest communication technology and setting up their servers as close as possible to the exchange has become the norm. One approach is to **co-locate** the trader's servers in the exchange (if offered). Fairness dictates that the exchange cannot selectively offer co-location to only a few traders.
2. *Computation speed:* Electronic traders minimize latencies by using the best hardware, including: overclocking the fastest processors (coupled with souped-up cooling systems), use of fast memory as opposed to hard disks (which are slowed by disc-seeking time), and the use of multiple processors, each specialized for the task at hand.

In addition to hardware, traders use software that has a low overhead, including simple, no-frills operating systems. Important functions often use assembler language rather than more high-level languages such as C++ whose compilers are not specialized, and hence, are slower. If the software tends to be dynamic (i.e., code gets updated as the market conditions change), code may be written in faster-to-write

languages (e.g., Python) as the speed of software deployment is more important than the speed of processing.

Sometimes, the latency in processing may be reduced by running the decision analysis for a wide variety of scenarios ahead of time. As such, the optimal action for each scenario is predetermined, avoiding delays once a scenario is actually observed.

LOS 11.h: Describe comparative advantages of low-latency traders.

Advanced Orders, Trading Tactics, and Trading Algorithms

Advanced order types are limit orders with a dynamic limit price that varies with a benchmark. For example, consider a pegged limit order to buy 1,000 shares at a price one tick lower than the lowest ask price. A broker that supports such an order type would forward the order to an exchange that also supports these types of orders. As the posted ask prices change, the original order is automatically canceled and replaced by a new order with a revised bid price.

Trading tactics are plans calling for the submission of multiple orders. One tactic is to send multiple orders at a given price through multiple exchanges so as to uncover any hidden trading opportunities. For example, a stock has a posted best bid and ask of \$18.00 and \$18.02, respectively. A limit purchase order at \$18.01 may uncover any hidden asks at that price. Alternatively, these tactics can uncover **discretionary orders**, which are orders that have a limit +/- discretion amount specified to the exchange. For example, a limit ask of \$18.03 with a discretion of \$0.02 may get uncovered by a limit buy order at \$18.01. Usually, these orders are structured to be **immediate or cancel (IOC) orders** (i.e., orders that are canceled unless executed immediately). Trading tactics may also be employed while trading at **dark pools**, which are trading venues that hide their liquidity and restrict trading to a select clientele.

Another trading tactic involves an IOC order at a specified price. If the order does not fill after a specified amount of time (which can be determined randomly), it is canceled and automatically replaced by another order with a better price. Trading tactics are often designed to reduce their footprint by introducing randomness into order size and the time to cancellation. In summary, trading tactics are often employed to execute **midsread orders** (i.e., limit orders pegged to the midpoint of the quoted bid-ask prices).

Algorithms (or algos) are programmed execution strategies using multiple orders, sequencing of orders, and trading tactics to achieve specific goals. For example, a VWAP algorithm may break up an order into orders proportional to expected trading volume, thereby reducing the price impact of a trade. Good algorithms seek to minimize the total transaction costs by judiciously using limit orders and offering liquidity when appropriate, as well as using market orders to minimize delay and opportunity costs.

Impact of Electronic Trading

Electronic markets and trading have changed how proprietary traders, brokers, and other traders devise their trading strategies. A few examples follow.

1. **Hidden orders.** These are limit orders that are hidden from the market except for the exchange receiving them. Hidden orders seek to remove the valuable option that exposed standing orders provide to the rest of the market. As compared to human traders, electronic markets are better suited for hidden orders because the probability of inadvertently exposing hidden orders is much lower for electronic markets. Some traders seek to expose hidden orders by repeatedly pinging the market (via submission of small IOC orders). If executed, these pings would reveal the existence of a hidden order (but not the size of the hidden order). Traders who subscribe to a trade feed for odd-lot trades would also see the results of successful pings. However, they would not know the side of the trade represented by the hidden order.
2. **Leapfrog.** This is the practice of beating the best bid or ask price. In the presence of large quoted bid-ask spreads, there are dealers who may be willing to post a better price (i.e., a lower ask or higher bid), thereby leapfrogging the best price. A leapfrogging limit order therefore narrows the inside spread. This frustrates other traders who have to quote a better price to maintain their order precedence, and this game of leapfrogging may continue!
3. **Flickering quotes.** These are exposed limit orders that are submitted and canceled almost immediately. This technique is used by traders not wanting to have standing orders that provide a valuable option to trade to other traders. Traders wanting to trade at the flickering quote can submit a hidden limit order to execute in anticipation of the return of the flickering order.
4. **Electronic arbitrage.** There are three types of electronic arbitrage strategies:
 - A. **Take liquidity on both sides.** This is an arbitrage trade to buy and sell the same security in different markets to take advantage of mispricing across markets. Arbitrageurs submit market buy and sell orders on a security simultaneously in different markets for execution at the posted ask and bid prices. Given the competition among arbitrageurs, these opportunities are few and far between, and low latency is critical to ensure that both sides of the trade get executed at target prices.
 - B. **Offer liquidity on one side.** Suppose a particular security is quoted at \$100 bid, \$105 offered in both markets X and Y. An arbitrageur may place a bid at \$95 in market X. If the order fills (probably due to a large transaction by some market participant), the arbitrageur will immediately try to sell the security to the \$100 bid in market Y, realizing a profit of \$5.
 - C. **Offer liquidity on both sides.** This is another arbitrage trade that seeks to further lower transaction costs by posting limit orders that are inferior to the best bid and offer prices in different markets. This strategy is fraught with risks; after one leg of the order is filled, if the other leg does not fill, the trader is exposed to risk of adverse price movement.

5. **Machine learning.** Also known as data mining, machine learning involves using statistical modeling techniques that allow the model to evolve based on new data. These techniques rely on empirical data to fine-tune trading algorithms but are ineffective during extraordinary times when volatility spikes and past information is not a useful guide to future outcomes. Many traders shut down trading during these high-risk periods.

EXAMPLE: Electronic arbitrage

Ben Khuslow, a trader for Greater Wealth Bank, is looking at his terminal for opportunities to trade. The default view on the terminal provides the best bid and offer prices for a security in different electronic markets. Khuslow observes the following quotes for stock ZZ:

Market	Best Bid	Bid Size	Best Ask	Ask Size
Alpha	\$10.06	20,000	\$10.12	18,000
Bravo	\$10.02	15,000	\$10.05	11,000

1. Assuming that Khuslow takes liquidity on both sides of the market, **calculate** the profit per share that Khuslow can expect to earn (if the quotes hold up for both sides of the trade).
2. **Explain** how Khuslow can increase the expected return per share by using either (a) offering liquidity on one side of the market or (b) offering liquidity on both sides of the market.
3. What are the risks of each of these strategies?

Answer:

1. The best bid across the two markets is \$10.06, and the best ask is \$10.05 (resulting in an arbitrage profit of \$0.01 per share). Khuslow can submit a market purchase order at the best ask of \$10.05 (for 11,000 shares) and simultaneously submit a market sell order at \$10.06 (again for 11,000 shares). Assuming that the prices don't move between the time Khuslow gets the quotes, submits the order, and the orders are received by the exchange, both segments would be filled, resulting in the \$0.01 per share arbitrage profit (or \$110 on 11,000 shares).
2. Regarding (a), instead of submitting a market order in both markets, Khuslow can submit a limit purchase order with a bid of \$10.04 in market Bravo. If Khuslow's trade gets filled at \$10.04, an immediate sell order in market Alpha (i.e., at posted bid of \$10.06) would now result in a profit per share of $\$10.06 - \$10.04 = \$0.02$.
Regarding (b), instead of using market orders, Khuslow can submit a limit purchase order with a bid of \$10.04 in market Bravo and a limit sell order in market Alpha (at an ask of \$10.07). If both legs get filled, the profit per share would now be $\$10.07 - \$10.04 = \$0.03$ per share.
3. With any of the strategies, the risk is that the prices may change before execution of one or both legs of the order. The time lag between quotes being refreshed at an exchange, its receipt by a trader, the trader's action on that quote, and communication of an action from the trader's computer to the exchange may make

the original quote stale. Hence, all or part of the order may not get filled. This failure-to-fill risk is lower for market orders, and hence, is highest when the trader offers liquidity on both sides of the market. The trader may find that only one side of the trade is filled, leaving him exposed to the risk of having a long (or short) position in a security.



MODULE QUIZ 11.3

- Which of the following is an example of achieving lower latency via computation speed?
 - Co-location.
 - Use of simple, no-frills operating systems.
 - Use of high-speed fiber optic networks.
- Limit orders with dynamic prices are *most appropriately* labeled as:
 - discretionary orders.
 - immediate or cancel (IOC) orders.
 - advanced orders.
- A leapfrog strategy is *most likely* to be employed during times of:
 - market fragmentation.
 - a large inside spread in a security.
 - flickering quotes.
- A highly risk-averse trader seeking to profit from mispricing across markets would *most likely*:
 - take liquidity on both sides.
 - offer liquidity on one side.
 - offer liquidity on both sides.
- A trader observes the following quotes for a stock in two different markets:

Market	Best Bid	Bid Size	Best Ask	Ask Size
Philly-1	\$16.13	50,000	\$16.14	48,000
LA-9	\$16.09	90,000	\$16.11	100,000

Assuming that the trader takes liquidity in both markets, the arbitrage profit would be *closest* to:

- \$1,000.
- \$2,000.
- \$4,000.

MODULE 11.4: RISKS AND SURVEILLANCE OF ELECTRONIC TRADING SYSTEMS



Video covering this content is available online.

LOS 11.i: Describe the risks associated with electronic trading and how regulators mitigate them.

Risks associated with electronic trading include:

- **High-frequency traders (HFT) arms race.** Due to the competitive advantage offered to the fastest market participants, high-frequency traders (HFT) need to deploy the latest and most expensive state-of-the-art technologies. This arms race

offsets some of the lower cost benefits of electronic trading, effectively serving as an entry barrier to some traders and making the playing field not level for smaller traders. This unfairness has led to calls to mitigate the advantage of HFT by introducing delays in trading at random intervals (which cannot be forecast by HFT algos).

- **Systemic risk.** This is the cost of bad trades being borne by parties other than the party responsible for the trade. Traders who don't face the full consequences of their actions have less incentive to take action to mitigate a bad trading decision. Programming errors in one trader's platform may lead to market chaos with many casualties before the error is spotted and corrected. Some of the common trading errors include:
 - **Runaway algorithms.** These produce a series of unintended orders. For example, the flash crash of May 2010 was caused by a trading algorithm executing a large market sell order on mini S&P 500 futures contracts. The algorithm was programmed to release orders proportionate to the trading volume in the contract, increasing the volume of trade in the contract, resulting in even more trading by the algorithm. Since the order was not a limit order, the algorithm caused a huge increase in volatility.
 - **Fat finger errors.** These are input errors, and if sufficiently large, can lead to dramatic volatility in an electronic market (where human checks and balances are missing).
 - **Overcharge orders.** These demand liquidity significantly higher than what is available in the market. These are market orders that are too large for the market to which they are sent. The flash crash resulting from a large market order to sell S&P 500 mini contracts led to ripple effects across markets.
 - **Malevolent orders.** These are created to specifically manipulate the market. Examples include aggrieved employees programming rogue trades and traders seeking to conduct denial-of-service attacks on their competitors with excessive submission of quotes.

Systemic risks can be mitigated by having proper checks and balances. Traders need to ensure that only authorized orders are inputted, and that the software they use is adequately backtested. Furthermore, updates to the trading software should be strictly controlled, and supervisory personnel should sign off on changes to the software before it is deployed.

Brokers must scrutinize orders received from their clients to ensure the appropriateness of the orders before submission to electronic markets. Finally, markets should have limits on price changes and automated trade halts, which kick in when volatility spikes.

LOS 11.j: Describe abusive trading practices that real-time surveillance of markets may detect.

Real-time surveillance and monitoring of electronic markets seek to detect market abuses and potential crises as they unfold, allowing for a faster response. Abusive

market practices include:

- **Front running.** This is low-latency trading ahead of known large trades. For example, a front runner who acquires information that a large buy order is being processed in pieces may take the best ask prices, and then resell to the unsuspecting buyer at higher prices. In most jurisdictions, front running is illegal if the information that serves as the impetus for front running is obtained improperly. In many cases, though, the information may be simply obtained from market data. Algorithms processing large orders often break them down into smaller pieces. Front runners, with the aid of machine learning, may sniff out these large orders allowing them to front run.
- **Market manipulation.** This includes activities that produce false market data, including price and volume data. Manipulative traders deceive other traders, causing them to act based on this misleading information to the advantage of the manipulators. While market manipulation is illegal in most jurisdictions, enforcement is lax due to the difficulty of separating manipulative trades from genuine ones. Market manipulation activities include:
 - **Trading for market impact.** These are trades designed to change the price (up or down), sometimes at a large cost. The objective is to influence other traders' perception of value.
 - **Rumormongering.** This involves dissemination of fake information to affect the target trader's value assessments. Analysts need to be able to parse large amounts of information (true and fake) to determine what information is valid and its implication for value. While rumormongering is generally illegal, biased reporting (highlighting one side of the story) is not.
 - **Wash trading.** This is trading between commonly controlled accounts to create an impression of false liquidity. Wash trading gives other market participants a false sense of security about liquidity in a particular stock.
 - **Spoofing or layering.** These are fake limit orders posted to create fake optimism or pessimism about the security. For example, a buyer wanting to buy a security cheaply may post a hidden limit order to buy at a price lower than the current market price, and one or more exposed sell orders also at a low price. The exposed sell orders may convince other traders that prices are falling and motivate them to sell at lower price, filling the hidden buy order. Layering is risky, as the exposed sell orders that the spoofer intended on canceling may actually get filled.
 - **Bluffing.** This involves preying on momentum traders. Momentum traders follow the market—buying in a rising market and selling when prices are falling. Bluffing involves posting orders to influence the perceived value of a security. For example, a *pump and dump* strategy involves buying a stock to raise its price only to sell it back at a higher price to the momentum traders. Pump and dump traders may also resort to rumormongering or wash trading to facilitate their pump and dump strategy. A similar, less common strategy on the sell side is the *short and distorts* strategy. Analysts should have a sound basis for their valuation (Standard V(A): Diligence and Reasonable Basis) so that they do not fall for bluffing.

- **Gunning the market.** This forces other traders into bad trades. For example, rapid short selling may collapse the market for a security, triggering stop-loss orders which are then filled by the manipulator, repurchasing those shares at a lower price.
- **Squeezing and cornering.** This involves obtaining control over resources needed to settle contracts and then withdrawing those resources, triggering defaults. Resources are then extended at a higher price. In a short squeeze, manipulators may take control of significant chunk of lendable shares, lending them to unsuspecting shorts. The manipulator can then recall the loans abruptly, forcing the shorts to cover at a higher price. Short traders should therefore use caution and ensure that there is a good diversity of lenders in the market before borrowing shares. Cornering, in a commodity market, involves long futures positions combined with buying much of the supply in the spot market. Corners then demand physical delivery for settling their futures positions, which the counterparty is unable to supply due to the spot market being cornered. This practice is illegal, and is prohibited by most futures exchanges. In general, long futures parties cannot force delivery unless they have a valid business reason. Enforcement is difficult, however, and is often gamed by the cornering traders.



MODULE QUIZ 11.4

Use the following information to answer Questions 1 through 3.

Ben Storm, CFA, is discussing the implementation of new trading algorithms that the firm has developed with the firm's head trader, Mihir Kotak. Storm states that he wants to ensure that there are appropriate checks and balances in place before these new strategies are deployed in the market.

Storm makes the following statements:

- I. We need to ensure that only authorized personnel can input orders.
- II. Updates to the algorithms need to be signed off by appropriate supervisory personnel.

Kotak makes the following statements:

- I. I am more concerned about traders seeking to conduct denial-of-service attacks on their competitors with excessive submission of quotes.
 - II. In some markets, rapid short selling may collapse the market for a security, triggering stop-loss orders.
1. Regarding Storm's statements about appropriate checks and balances:
 - A. both statements are correct.
 - B. neither of the statements is correct.
 - C. only one of the statements is correct.
 2. Kotak's statement I *most accurately* describes the trading tactic of:
 - A. Bluffing.
 - B. Gunning the market.
 - C. Malevolent orders.
 3. Kotak's statement II *most accurately* describes the trading tactic of:
 - A. Bluffing.
 - B. Gunning the market.

KEY CONCEPTS

LOS 11.a

Explicit trading costs include brokerage, taxes, and fees; implicit costs include the bid-ask spread, price impact, slippage, and opportunity cost.

LOS 11.b

Effective spread = $2 \times (\text{effective spread transaction cost})$

VWAP transaction cost = $\text{trade size} \times (\text{side}) \times (\text{trade VWAP} - \text{benchmark VWAP})$

where:

side = +1 for buy orders and -1 for sell orders

LOS 11.c

Implementation shortfall is the difference in value between a hypothetical (or paper) portfolio in which the trade is fully executed with no cost, and the value of the actual portfolio.

LOS 11.d

The factors driving the development of electronic trading systems include lower cost, higher accuracy, provision for audit trails, fraud prevention, and a continuous market during trading hours.

LOS 11.e

Market fragmentation results when a security trades in multiple markets. Trading algorithms such as liquidity aggregation (i.e., creation of a super book) and smart order routing seek to overcome the challenges posed by market fragmentation.

LOS 11.f

Electronic traders include news traders, dealers, arbitrageurs, front runners, quote matchers, and buy-side traders.

LOS 11.g

Latency is defined as the time lapse between the occurrence of an event and execution of a trade based on that event. Electronic trading systems allow low-latency traders a competitive advantage by jumping the order queue.

LOS 11.h

Electronic market traders employ advanced orders, trading tactics, and trading algorithms. Electronic markets enable hidden orders, leapfrogging algorithms, flickering quotes, electronic arbitrage, and machine learning.

Risks of electronic trading include HFT arms races at a disadvantage to small traders, as well as increases in systemic risk due to runaway algorithms, fat finger errors, overcharge orders, and malevolent orders.

LOS 11.j

Real-time surveillance and monitoring of electronic markets seek to detect market abuses and potential crises as they unfold, allowing for a faster response. Abusive trading practices include front running and market manipulation. Market manipulation activities include trading for price impact, rumormongering, wash trading, spoofing, bluffing, gunning the market, and squeezing and cornering.

ANSWER KEY FOR MODULE QUIZZES**Module Quiz 11.1**

1. **B** The first trade would occur at the best ask price of \$17.69, exhausting the quantity offered. The second trade would occur at the next-best ask price of \$17.71, resulting in a price impact cost of \$0.02 per share. (LOS 11.a)
2. **C** Inside spread = best offer – best bid = \$17.69 – \$17.65 = \$0.04 per share. (LOS 11.b)
3. **C** Benchmark VWAP = $(1,000 \times \$44.55) + (3,000 \times \$44.65) + (6,000 \times \$44.75) / 10,000 = \44.70 . (LOS 11.b)
4. **B** Trade VWAP = $(1,000 \times \$44.65) + (500 \times \$44.75) / 1,500 = \$44.68$. (LOS 11.b)
5. **A** Trade VWAP – benchmark VWAP = $\$44.68 - \$44.70 = (-\$0.02)$, an improvement of \$0.02 per share. Total VWAP transaction cost = $1,500 \times (+1) \times -\$0.02 = -\$30$. (LOS 11.b)
6. **B** The VWAP transaction cost approach is suitable when the trade being evaluated is a small part of the overall trading in that security. When the trade is a significant part of the overall trading volume, the benchmark VWAP and trade VWAP would be very close, and the VWAP transaction cost will be close to zero. (LOS 11.b)
7. **C** Implementation shortfall captures the price impact, delay (or slippage), and opportunity cost of a trade. (LOS 11.c)

Module Quiz 11.2

1. **C** The factors driving the development of electronic trading systems include lower cost, higher accuracy, provision for audit trails, fraud prevention, and continuous market during trading hours. Market fragmentation is the result of electronic trading and not a reason for developing systems. (LOS 11.d)
2. **A** While electronic trading has lowered costs and improved efficiencies for stock traders, electronic trading in the bond markets is primarily between dealers, and hence, has not benefited retail investors. Electronic markets do not need human

intervention, and hence, can function even when humans cannot reach a trading floor due to severe weather. (LOS 11.d)

3. **A** Trading algorithms such as smart order routing and liquidity aggregation seek to overcome the challenges posed by market fragmentation. Liquidity aggregation algorithms create a super book displaying liquidity across all markets. Smart order routing algorithms send orders to the markets with the best prices and sizes. (LOS 11.e)
4. **A** Electronic front runners use artificial intelligence to sniff out large trades (or many small trades) on the same side and then use low latency to trade ahead of them. (LOS 11.f)

Module Quiz 11.3

1. **B** Co-location and use of high-speed fiber optic networks seek to reduce the latency by using faster communication between the trader's computer and the electronic market. The use of simple, no-frill operating systems reduces the overhead burden on a computer's resources, and hence, reduces the latency due to computation speed. (LOS 11.h)
2. **C** Advanced orders are limit orders with dynamic prices. IOC orders would get canceled if not immediately filled at the price specified. Discretionary orders provide a specified discretion amount with the limit price to an electronic exchange that supports discretionary orders. (LOS 11.g)
3. **B** Leapfrog is the practice of beating the best bid or ask price. In the presence of large quoted bid-ask spreads, there are dealers who may be willing to post a better price (i.e., a lower ask or higher bid), leapfrogging the best price. (LOS 11.g)
4. **A** A highly risk-averse trader would submit market orders in both markets if an arbitrage is feasible. Submission of a limit order in either (or both) markets increases the risk for the trader of not completing part of the round-trip transaction. (LOS 11.g)
5. **A** A trader would purchase 50,000 shares from LA-9 at \$16.11 and sell them in Philly-1 at a price of \$16.13, resulting in a profit of \$0.02 per share or $50,000 \times 0.02 = \$1,000$. (LOS 11.g)

Module Quiz 11.4

1. **A** Both statements by Storm are correct as being part of appropriate checks on algorithmic trading. (LOS 11.i)
2. **C** Malevolent orders are more nefarious orders created to specifically manipulate the market. Examples include aggrieved employees programming rogue trades and traders seeking to conduct denial-of-service attacks on their competitors with excessive submission of quotes. (LOS 11.i)
3. **B** Gunning the market is a manipulative trade forcing other traders into a bad trade. Excessive sell orders to trigger stop-loss trades is an example of gunning the

READING 12

CASE STUDY IN PORTFOLIO MANAGEMENT: INSTITUTIONAL (SWF)

EXAM FOCUS

The focus of this reading is risk considerations associated with the portfolio strategy of an institutional investor. A fictional sovereign wealth fund is the case study for the reading, which illustrates the risks associated with direct investments in illiquid assets. The case study also has a strong focus on environmental, social, and governance (ESG) risks. As a Level III candidate, you will be required to analyze and quantify a wide variety of risks as the case study develops over time.

This reading also includes a variety of risk management and measurement approaches and introduces the components of an enterprise risk management (ERM) system. Candidates must be able to recognize the strengths and weaknesses of an ERM system in exam questions and be able to recommend improvements.

MODULE 12.1: FINANCIAL RISKS FACED BY INSTITUTIONAL INVESTORS



Video covering this content is available online.

LOS 12.a: Discuss financial risks associated with the portfolio strategy of an institutional investor.

Risk Management for Institutional Investors

Risk management is concerned with the impact of events and exposures to risk factors that may prevent an organization from achieving its long-term objectives. Risks explored in this reading include financial risks such as market and liquidity risk, and non-financial risks such as operational and reputational risk.

Investors are increasingly interested in **environmental, social, and governance (ESG) issues** and want to engage with portfolio companies ever more closely to monitor business plans and activities. Global issues such as climate change, sustaining the environment, fair treatment of labor, employee health and safety, and addressing standards of living in the poorest nations are becoming important considerations when choosing investment assets. How might these ESG issues impact investors?

Investors are keen to avoid being associated with any adverse publicity and potential **reputational damage** from investing in companies with negative environmental, social, and governance impacts, sometimes referred to as **headline risk**. The investment strategy of aligning portfolio assets to benefit from the ongoing ESG transition to a more sustainable world is attracting a lot of interest as a medium to long-term investment strategy.

Institutional Investor Risk Objectives

Pension funds provide retirement income to plan members. The key risk is the inability to meet contractual pension payouts to beneficiaries when due.

Endowments and foundations aim to provide financial support to current and future beneficiaries, so maintaining *intergenerational equity* (i.e., being fair to current and future generations). The key risk is the inability to provide sufficient financial support to the budget of the institution, preventing the institution from fulfilling its mission and purpose.

Sovereign wealth funds have varying objectives but, in general, provide government funding in either the short, medium, or long term. The case study later in this reading is a fictitious sovereign wealth savings fund set up to transfer wealth to future generations over the long term. Typically, the proceeds from the discovery and sale of valuable natural resources forms the capital invested in sovereign wealth savings funds.

Banks and insurance companies focus mainly on asset-liability management. Banks borrow short term and lend long term, creating an inherent duration mismatch, which introduces liquidity risk and interest rate risk. Banks aim to earn the spread between lending rates and funding rates, known as the net interest margin.

Insurance companies also need to fund the products they sell, which may be a contingent claim many years in the future (e.g., a life insurance policy). Both banks and insurance companies are required to hold minimum levels of solvency capital and are not the focus of this reading.

Risk Consideration: Illiquid Assets

The **endowment model** assumes a long, often perpetual time horizon. Institutions such as university endowments aim for real long-term growth to fund their future spending, yet also need to be fair and equitable to current students.

To achieve long-term growth, institutions turn up the risk dial and include high allocations to illiquid asset classes such as private equity, real estate, hedge funds, natural resources, and infrastructure. However, this creates a dilemma for the institution. With large allocations to illiquid assets, how does an organization meet its current liquidity spending needs, both in normal market conditions and in a crisis? There is a saying, “You can’t eat an illiquid asset.”

This leads to the risk that an organization is unable to make the very payments that the institution was set up to provide. Finding the right balance between liquid and illiquid assets and to carefully plan sources of contingency funding is important.



PROFESSOR'S NOTE

Before the financial crisis in 2008, the Harvard Endowment held approximately 55% of its portfolio in private equity, hedge funds, and real assets. Between July 1 and October 31, 2008, the endowment fell 22%, a drop of \$8 billion. Harvard faced a liquidity crisis. How do you fund current spending with illiquid assets? Ultimately, Harvard chose to borrow to secure the funding needed rather than suffer losses by selling illiquid assets at deep discounts.

VvK

Risk Consideration: Types of Liquidity Risk

Liquidity risk has different dimensions and definitions. **Market liquidity** (a.k.a. asset liquidity) refers to how quickly an asset can be sold at a fair price. The relative size of a holding versus the market volume is an important factor, as is market turnover and current trading conditions. For example, selling 500 shares will be easier than selling 500,000. Selling in normal trading conditions will be very different from selling in a crisis, when many investors are heading for the exits at the same time.

Funding liquidity risk is the risk of being unable to meet financial obligations when due. The Harvard Endowment in 2008 is a good example to illustrate both types of liquidity risk. Being unable to sell a large proportion of portfolio assets, except at fire sale prices, illustrates asset illiquidity. However, being able to raise funds via borrowing to meet spending obligations illustrates that Harvard had available sources of funding liquidity.

Risk Consideration: Liquidity in a Crisis

In normal market conditions, portfolios may perform in line with long-term expectations, liquidity is plentiful, and market sentiment is positive. In crisis conditions, many markets react negatively to uncertainty and liquidity disappears as investors run for the exits.

Notice how funding liquidity and market liquidity are connected. In a crisis, sources of funding often dry up or become expensive (such as securitizations). At the same time, market liquidity can also fall, leaving investors with illiquid assets and liquidity funding shortages.

Liquidity Needs and Sources for Institutional Investors

Liquidity outflows will vary considerably depending on the contractual obligations of each institutional investor. Pensions have contractual payments to retirees due today and promised future payments to active plan members. Endowments and foundations may have more discretion over their current and future spending plans. Sovereign wealth funds may have long-term multigenerational time horizons or be required to support a government budget deficit today.

Liquidity outflows can also be in the form of **capital calls**. Private equity investments call for investor capital in stages, with investors receiving capital calls, often at short

notice, making liquidity planning more difficult. Capital calls are a good reason not to overcommit to this asset class and to provision the required liquidity funding. The **denominator effect** is the risk that portfolio allocations to illiquid assets increase due to capital calls.

Liquidity inflows include pension contributions and donations for endowments and foundations. Inflows also include investment distributions received from illiquid investments such as private equity. Donations can fluctuate, especially in economic downturns, as donors may be less able to contribute.

Portfolio rebalancing is more difficult to implement with illiquid assets. Rebalancing a portfolio back to the agreed strategic asset allocation requires selling and buying portfolio assets. This will be more costly to achieve with substantial illiquid holdings in normal market conditions and may not be possible at all in a crisis. Portfolio assets held for liquidity include cash and fixed income; however, the endowment model aims for long-term growth with lower allocations to these liquid assets.

Risk Consideration: Illiquid Assets and Return Smoothing

Return smoothing results from investments in illiquid assets, such as private equity and real estate, held for long time periods in private markets. The lack of transactions in these illiquid private markets creates a valuation problem. How do we value the assets with no recent transactions? Portfolio valuations are, instead, based on appraisal estimates that lag “true” values. Smoothing creates a false picture of volatility by applying a downward bias.

The **impact of smoothing** in a rising market is that asset values and return estimates are too low, leading to falsely low return volatility. In a falling market, asset values and return estimates are too high, leading again to a false picture of low volatility. The common impact of smoothing on return volatility is that it appears low, creating a false impression of lower risk.

Using **smoothed data** results in poor decision-making in asset allocation. Assets with smoothed returns appear to have lower correlations with the rest of the portfolio. A consequence may be to overallocate to illiquid assets aiming for increased portfolio diversification. In reality, the assets have higher “true” volatility and higher correlations with portfolio assets, so relying on smoothed data is misleading.

Public market equivalents are an effective proxy for returns in private markets. Using small-cap equities as a proxy for private equity is an example of this approach. A second approach is to unsmooth the illiquid asset returns (i.e., bring back the true volatility by removing the first- and higher-order serial correlations in observed returns).

Risk Consideration: Direct vs. Indirect Investments in Illiquid Assets

Direct investments in illiquid asset classes, such as private equity and infrastructure, are in the form of sole or co-ownership (co-investing) of a private company.

Advantages of direct investments in illiquid assets are:

- Control over individual investment assets.
- Increased portfolio liquidity due to control over the timing of exits.
- Access to more detailed firm information and business plans.
- Avoids paying fund management fees (e.g., 2% per annum (pa) and 20% profit sharing over a hurdle return).

Disadvantages of direct investments in illiquid assets are:

- Portfolio concentration risk results given the challenge to diversify across enough projects.
- Attracting and retaining in-house expertise is challenging and expensive.
- Directly owning a business can lead to additional liabilities (e.g., products, customers, legal, health and safety, employee welfare, and environmental).
- Being a direct owner increases reputational risk due to being closely associated with a firm should problems occur.

Indirect investments in illiquid asset classes, such as private equity and infrastructure, are in the form of investment funds via a third-party investment manager.

Advantages of indirect investments in illiquid assets are:

- Increased diversification across individual projects reduces idiosyncratic risks. It is common to also diversify across project vintage years (the year an investment is first made).
- Specialized fund management expertise can be outsourced, so there is no need to recruit, retain, and compensate an internal team.
- Liability is limited to only the funds invested.

Disadvantages of indirect investments in illiquid assets are:

- Little control over choice of portfolio assets.
- Less information available on individual assets.
- Lower portfolio liquidity, as no control over the timing of exits.
- Payment of fund management fees, typically 2% annual management and 20% share of profits above a hurdle return.
- Uncertain timing of capital calls, which creates liquidity risks.

Managing Liquidity Risk

Institutional investors use various tools to estimate and manage their liquidity needs.

A five-step liquidity management process is as follows:

Step 1: Establish liquidity risk parameters (policy guidelines, escalation triggers).

Step 2: Assess the liquidity of the current portfolio (measure vs. guidelines; monitor).

Step 3: Develop a cash flow model (project future expected cash flows).

Step 4: Stress test liquidity needs (and cash flow projections).

Step 5: Plan for emergencies (a.k.a. a contingency funding plan; what to liquidate, other funding options).



MODULE QUIZ 12.1

1. You are reviewing indirect investments in private equity. Which of the following is *most accurate* of this investment approach?
 - A. Indirect investments decrease portfolio liquidity.
 - B. Indirect investments incur annual fund management fees and avoid profit sharing.
 - C. Indirect investments have higher asset concentrations.
2. Which of the following is *least accurate* of unsmoothed returns?
 - A. Volatility is biased downward.
 - B. Market transactions are plentiful.
 - C. Appraisals are rarely used.
3. **Identify** *two* disadvantages of direct investments in private asset classes.

MODULE 12.2: ENTERPRISE RISK MANAGEMENT



Video covering this content is available online.

LOS 12.e: Evaluate strengths and weaknesses of an enterprise risk management system and recommend improvements.

Perspectives of Risk Management

Top-down perspective is set by the board of directors and the chief investment officer (CIO). It defines the overall risk tolerance, return objectives, and overall investment guidelines for the institution. It also establishes an enterprise risk management framework to optimize risk and return decisions, coordinate risk planning and actions, and help make better strategic business decisions.

Bottom-up perspective is taken by the investment team tasked with implementing the investment strategy. This involves measuring, monitoring, and reporting risk exposures of individual portfolios and asset classes. An internal investment team could be in place or hire external asset managers and monitor progress toward the overall return and risk objectives.

Portfolio-level risk is a function of the correlations and covariances of the assets in the portfolio. Assets, risk factors, and correlations will likely behave very differently in crisis periods.

Asset class-level risk requires detailed information that may be challenging to obtain. For public securities, such as equities, detailed information will likely be readily available, whereas for privately held investments, such as private equity or hedge funds, information may be less detailed and available less frequently.

Returns-based risk systems focus on the analysis of an investment manager's historic returns for a fund or strategy. Note the assumption that past performance is helpful in estimating future performance and evaluating manager skill.

Holdings-based risk systems have access to the details of the underlying assets held in the fund. Access to this granular level of data may not be available, especially for hedge funds aiming to maintain confidentiality over proprietary investment strategies. Holdings-based systems are more costly and time consuming to analyze and implement.

Absolute risk measures risk on a stand-alone basis.

Relative risk compares risk and return to a suitable benchmark.

Short-term risk metrics focus on estimating short-term losses. Calculations of volatility, value at risk, and conditional value at risk focus on relatively short time periods (all discussed later in this reading).

Long-term risk metrics, including Monte Carlo simulation, provide estimates of asset values and cash flow spending over longer time periods. Monte Carlo simulation is a powerful tool for exploring various assumptions, portfolio allocations, and spending strategies and is able to incorporate the effects of rebalancing strategies.

Quantitative models are a useful resource in risk management (e.g., value at risk, stress testing, and Monte Carlo simulation). Behind every model are assumptions such as distributions, data periods, time horizons, growth, inflation, and default rates that drive future estimates and values. Rather than predict the future, these models aim to show a range of possible futures.

Qualitative risk assessments are also important in risk management. Risks such as reputational risk and operational risk are very difficult to quantify. The **four eyes** principle (two heads are better than one) is an important resource in risk (i.e., discussing risks, sharing experience, and cross-functional investment committees).

Human biases from personal experience and beliefs influence both quantitative and qualitative approaches in the assumptions chosen. For example, many U.S. credit practitioners had not experienced real estate price declines until 2008.

Due Diligence and Ongoing Risk Monitoring

Investing in alternative assets such as hedge funds, private equity, and real assets requires considerable due diligence to assess financial, operational, and investment risks prior to investing.

Due diligence evaluating an investment team, its operations, risk management practices, custodians, safekeeping of assets, and the business ethics of a firm is essential. A growing component of due diligence covers environmental, social, and governance issues, discussed later in this reading.

Applying a Enterprise Risk Management Framework to Institutional Investors

Enterprise risk management (ERM) is a top-down approach in which an organization decides which risks to take and which to avoid or transfer to achieve its purpose and objectives.

ERM typically includes all risks faced by an organization, including major risks such as:

- Credit risk.
- Market risk.
- Operational risk.
- Liquidity risk.
- Reputational risk.
- Environmental, social, and governance risks.

ERM starts with strong governance from the board of directors and clearly defines risk tolerances and return objectives creating a coordinated risk management framework with clear accountabilities throughout the organization.

A typical risk management process involves the following steps:

Step 1: Identify risks.

Step 2: Measure risks.

Step 3: Perform risk mitigation and management.

Step 4: Monitor risks.

Step 5: Report risks.

Step 6: Use analysis and strategic planning.

Enterprise Risk Management Framework

The **board of directors** sets the overall risk tolerance and return objectives for the organization. The risk framework will usually include an internal investment committee and CIO. The investment committee will include senior leaders across the organization to leverage strategic experience and risk expertise.

An **investment policy statement (IPS)** is the investment plan specifically tailored to the organization's objectives and constraints, acting as a route map toward achieving the required return objectives.

Risk tolerance is defined within the IPS. Specific risk tolerances can be set for the following:

- Volatility.
- Maximum drawdown.
- Value at risk and conditional value at risk.
- Leverage, derivatives, and short positions.

- Limits on illiquid holdings.
- Maximum tracking error budgets.

The objective is not to minimize or eliminate risk but instead to optimize the compensation for taking the risk (i.e., take the right level of risk for the institution).

Risk Measurement Methodologies

Value at risk (VaR) is an estimate of an unexpected loss of an asset or portfolio, at a given confidence level, for a given holding period. Unexpected losses are low frequency, high severity events.

- Expected losses (high frequency, low severity)
- Unexpected losses (low frequency, high severity)
- Catastrophic losses (very low frequency, very high severity)

VaR defines unexpected losses at a chosen confidence level, typically 95%, 99%, or 99.9%.

Consider an example of a 1-day, 95% VaR estimate of \$1 million.

- The confidence level is 95%, meaning we assume that 95% of the time, the maximum loss will be \$1 million.
- The significance level is 5%, also known as the error rate, meaning that 5% of the time the loss will be larger than the \$1 million estimate.

A common misconception is that VaR describes the maximum possible loss. In the previous example, there is a 5% chance that the losses will exceed the VaR estimate of \$1 million and fall into the catastrophic loss category.

When selecting a VaR holding period, it is important to consider the *liquidity of the asset* or portfolio. For many years, regulators assumed a 10-day VaR holding period for market risk, assuming that most assets can be liquidated in 10 days. The 2008 crisis showed that, for many assets, 10 days is insufficient, and so regulation now requires the consideration of longer holding periods.

While VaR is a useful tool to explore unexpected losses, consideration must also be given to *catastrophic losses* that lie in the tail of the distribution *beyond the VaR estimate*.

Conditional VaR is defined as the *average loss beyond a VaR estimate*. Conditional VaR is also widely referred to as expected shortfall and expected tail loss.

Consider an example of a 1-day, 95% VaR estimate of \$1 million.

- Conditional VaR focuses on the tail of the loss distribution, beyond the VaR estimate.
- It explores the potential for losses to be higher than the VaR scenario (i.e., explores catastrophic losses).
- It takes an average of the losses beyond the VaR estimate.
- It is a useful complement to VaR to explore non-normal market conditions.

Stress testing and scenario analysis are also important risk tools to explore the uncertainty of the future. Business models estimate future revenues, costs, and earnings using realistic assumptions today. Stress testing explores how *changes in assumptions* affect business revenues, costs, and earnings. A business model may look attractive in normal market conditions; however, conditions may change.

Stress testing identifies *critical factors* driving the success and profitability of a business and explores how unexpected changes in critical factors impact revenues, costs, and earnings. Stress testing is a form of “*what if*” *analysis*, helping to understand critical vulnerabilities and aiding contingency planning.

Scenario analysis explores historical, current, and hypothetical events that may affect a business. For example, climate scenario analysis is currently a hot topic trying to explore the potential impacts of climate change over time.

Maximum drawdown is the greatest drop in net asset value measured from a high to a low over a specific time period (e.g., the maximum daily drawdown). This is an intuitive risk measure because it is easier to relate to the concepts of declines in value (i.e., drawdowns as opposed to complex calculations).

Maximum drawdown is commonly used as a risk-adjusted return measure, such as return over the maximum drawdown, so that the risk taken is in context with the returns earned, and then used as a comparable ratio.

Portfolio factor analysis indicates common drivers and correlations within portfolio assets. It is essential to *look through* portfolio assets to understand common factor exposures.

Examples of portfolio risk factors include the following:

- Growth, value, and momentum.
- Volatility and credit.
- Liquidity.
- Currency.
- Equity.
- Environmental, social, and governance.

Strategically selecting **factor exposures** and **required levels of diversification** across factors are important risk and return considerations.

Tools to explore factor exposures include these:

- Returns-based analysis (analyzing a manager or fund’s past returns).
- Holdings-based analysis (analyzing the holdings within a fund).
- Scenario analysis (historic and forward looking).
- Stress testing (of critical risk factors).

Strategic asset allocation (SAA) is the long-term policy asset allocation that sets the optimum course toward achieving an organization’s investment objectives. The SAA is implemented internally by an in-house investment team, or externally via third-party

investment managers. The portfolio is regularly monitored, reviewed, and rebalanced, in line with the investment policy statement.

Appropriate benchmarks are selected for public equity investments to allow the measurement and assessment of active return (alpha) and active risk (tracking error). To be effective, benchmarks should reflect the manager's style and fulfill the **SAMURAI criteria** contained in the CFA LIII Evaluation Readings (originally defined by Bailey & Tierney 1998).

Characteristics of a valid benchmark are as follows:

- Specified in advance.
- Appropriate and consistent with the manager's investment style.
- Measurable.
- Unambiguous, able to clearly identify the securities.
- Reflective of current investment opinions.
- Accountable, accepted by the manager.
- Investible, possible to replicate passively.

Currency risk exposures are aligned to risk tolerances and monitored carefully because they can have a large impact on domestic returns when foreign returns are converted back to the reporting currency. The IPS will specify passive, semiactive, or active currency approaches, depending on risk tolerance, experience, and expertise in this area.

Currency hedging can be costly and more difficult to achieve in emerging markets due to the lower availability of derivative instruments.

Allocation drift is the drift away from the desired strategic asset allocation. Regular rebalancing strategies are agreed on to bring the portfolio back in line with the strategic asset allocation.

Reporting to stakeholders means reporting to bodies such as to the internal investment committee and the board of directors.



MODULE QUIZ 12.2

1. A risk analyst estimates a 95%, 10-day VaR of \$1.25 million. The investment committee asks the analyst to change the VaR model assumptions. Which of the following is correct?
 - A. An increase in the significance level will increase the VaR estimate.
 - B. A decrease in the holding period will reduce the VaR expected loss.
 - C. An increase in the confidence level will increase the conditional VaR.
2. Which of the following is *least accurate* of an enterprise risk management system?
 - A. Risk tolerance is set by the chief investment officer.
 - B. Maximum drawdown provides short-term risk estimates.

C. Returns-based risk systems are more likely to be preferred to holdings-based risk systems with hedge fund risk analysis.

3. **Identify** *three* steps in the enterprise risk management process.

MODULE 12.3: ENVIRONMENTAL AND SOCIAL RISKS FACED BY INSTITUTIONAL INVESTORS



Video covering this content is available online.

LOS 12.b: Discuss environmental and social risks associated with the portfolio strategy of an institutional investor.

Externalities, Responsible Investing, and Universal Ownership

Externalities are costs or benefits received resulting from the actions of third parties. For example, during the COVID-19 pandemic, enforced lockdowns led to commercial winners and losers. Sectors such as hospitality and retail were negatively affected; however, the enforced switch to online business also brought new opportunities for growth and innovation.

Principles for responsible investing (PRI) is a voluntary framework developed in 2006 by the United Nations in collaboration with the investment community, to incorporate ESG issues into investment analysis and decision-making. A key theme of the framework is for investors to be **active owners** engaging with portfolio firms and seeking ESG disclosures. The aim is to understand current ESG exposures (e.g., carbon dependencies from fossil fuels) and review adaption plans and revised business models for those businesses needing to change to a zero-carbon world.

Universal ownership is a concept that applies to large institutional investors such as pension funds and sovereign wealth funds that create large well-diversified portfolios. The concept of being a universal owner is that, in large portfolios, these investors have their share of both winners and losers from externalities.

For example, a portfolio firm that pollutes a river to save costs may well be increasing costs for other firms in the portfolio that rely on the availability of natural resources, such as clean water. The universal owner does not benefit from investing in firms following such practices. Instead, the universal owner benefits from raising ESG standards overall across society.

Environmental and Social Factors

Institutional investors are increasingly incorporating environmental and social factors into investment decisions alongside traditional financial factors. A common strategy is to align portfolio exposures to sectors, industries, and firms, which are likely to prosper in transitioning to a more sustainable society. Conversely, it is important to avoid investing in firms with poor management practices in the treatment of their workforce, health, and safety or with environmental issues.

Environmental Issues

- Air and water pollution.
- Carbon emissions and climate change.
- Energy efficiency.
- Water scarcity and waste management.
- Deforestation and biodiversity.

Social Issues

- Human rights and labor standards.
- Gender and diversity.
- Occupational health and safety.
- Customer satisfaction and product responsibility.
- Data security and privacy.
- Community relations and charities.

Climate Risks and Opportunities

The **2015 Paris Climate Agreement** encouraged countries and companies to reduce or eliminate carbon emissions, in order to limit global temperature increases to 2 degrees Celsius (+2DC) above pre-industrial levels. Individual countries determine their own nationally determined contributions (NDCs), which are pledges toward reducing their national carbon emissions.

While this was a positive step in the right direction, current levels of global NDC pledges to reduce carbon emissions are insufficient. To achieve the Paris Agreement goal, carbon emissions need to fall 25% by 2030 and reach net zero carbon by 2070, according to the Intergovernmental Panel on Climate Change.

The world needs to transition toward a low carbon future, but how easy or difficult will this be, and how fast or slow will the transition happen? Aligning portfolio assets and exposures to those sectors, technologies, and firms likely to benefit from this transition over the medium to long term is a popular ESG strategy. Conversely, there should be a push toward avoiding sectors, technologies, and firms with earnings linked to fossil fuels and outdated unworkable business plans in a future zero-carbon economy.

Stranded assets are resources that are no longer viable and difficult to monetize due to new regulatory restrictions, outdated technology, or shifts in consumer demand (e.g., coal mines, black and white TVs, tape decks, etc.). Firms that fail to adapt may find outdated assets stranded.

The **Inevitable Policy Response (IPR)** is research estimating *when* (not if) governments and policymakers will make the necessary regulatory changes to deliver the climate change needed, to meet the objectives set in the Paris Agreement.

The research uses the term **inevitable**, meaning governments will be forced to act more decisively, as the longer the delay in taking action, the more abrupt the policy changes

will need to be in the future, and the greater the economic shocks in transitioning to a zero-carbon world.

The research conducted by Vivid Economics and Energy Transition Advisers, explores the impacts of transition risk on the macroeconomy, sectors, regions, asset classes, and on the implications for land use. The research forecasts that policy responses are required by 2025, which could be abrupt, forceful, and disorderly, and would bring considerable transition risks and economic shocks.

Adapting to climate change will bring winners and losers. Firms that invest in new low carbon technology and that can adapt to new business models will become the early winners. Firms relying on fossil fuels and outdated practices may find higher taxes and limits on activities, and changes to customer preferences could find existing business models are no longer viable. For example, the switch to electric vehicles is already underway and it is accelerating as countries change policies and the regulation of fossil fuels.

Climate Risks: Transition Risk and Physical Risk

Climate transition risk is the risk of being too slow to transition to the new zero-carbon world, effectively left behind with an outdated business model. While it is widely accepted that the physical climate risks are the gradual impacts zero-carbon transition is inevitable, the speed that this transition will happen is uncertain.

Drivers of transition risk are as follows:

- Future changes in carbon regulation (e.g., carbon limits, carbon taxes, and bans).
- Higher input costs (of fossil fuels) reducing profit margins.
- Development of new clean technologies (e.g., transition to electric vehicles).
- Shifts in consumer preferences (e.g., transition away from fossil fuels).
- Increased environmental concerns and increased global coordination (e.g., Paris Agreement 2015).

Climate transition risk is systemic in nature, affecting whole sectors, regions, and cities. Systemic impacts from transition risk also include customers, suppliers, distribution channels, transportation, and vital infrastructure. The interconnectedness of local economies to climate risk factors results in the modeling of climate risk scenarios being highly complex.

Physical climate risk has two dimensions:

- Acute physical risks.
- Chronic physical risks.

Acute physical climate risks are *one-off weather events*. Examples include the following:

- Wildfires.
- Hurricanes.
- Storms.

- Droughts and heat waves.

Climate change is increasing the frequency and intensity of these weather events.

For example, the devastation of a hurricane or a wildfire, to human life, as well the potential for damaging businesses, property, and portfolio assets, has been increasing. Hurricane Katrina in the United States in 2005 resulted in 1,800 deaths and \$125 billion in damage. In 2020, there were numerous global wildfires, notably in Australia, California, and Oregon, resulting in loss of life and billions of dollars of damage.

Chronic physical climate risks are the *gradual impacts of climate change*. Examples include:

- Rising sea levels.
- Rising temperatures from global warming.

Coastal areas are affected by rising sea levels, with real asset values falling and properties becoming uninsurable. Towns and cities near water may find that the changing climate means having to relocate.

Rising temperatures affect infrastructure, such as roads and railways, leading to the accelerated depreciation of these assets and increased costs. In warm climates, rising temperatures disrupt working conditions and the ability to provide products and services in heat waves.

New Risk Factors: Location and Temperature

Physical climate risks illustrate the importance of the *location of portfolio assets* and the resulting risks of flooding due to sea level rises and one-off weather events such as storms, hurricanes, heat waves, and droughts. Portfolio assets may also be impacted by *increases in local temperatures* in certain locations (e.g., droughts, heat waves, and wildfires).



PROFESSOR'S NOTE

Location and temperature are important risk factors in the case study later in this reading. Be sure to read the background due diligence case study notes carefully.

The **Task Force on Climate-Related Financial Disclosures (TCFD)** encourages organizations, including banks, asset managers, and asset owners, to make climate related disclosures within existing reporting requirements. The TCFD, established in 2015, is a voluntary disclosure framework that encourages organizations to make disclosures in the following areas:

- Governance.
- Strategy.
- Risk management.
- Metrics and targets.

Firms have access to climate-related scenarios to estimate the future impacts to their business models and firm assets, from both physical and transition climate risks.

Climate Risk Responses: Mitigation and Adaptation

Climate risk mitigation and adaptation strategies reduce the vulnerability to both physical and transition climate risks. **Mitigation strategies** reduce the reliance on fossil fuels and carbon intensive resources. Increases in carbon regulation, restrictions on usage, and carbon taxes will likely increase input costs.

Adaptation strategies look to prosper in the zero-carbon world, investing in markets, companies, and technologies that are likely to benefit from the transition. Climate change brings many new opportunities aligned to future decarbonization policy and regulation, and it aligns to changing consumer preferences and the opening of new zero-carbon markets, products, and services.

New opportunities include the following:

- Clean energy (providers and manufacturers of clean energy: solar, wind, hydro).
- Energy efficiency (products and services to improve energy efficiency, such as recycling).
- Batteries and storage (products improving storage capacity; impacts for electric vehicles).
- Smart grids (digitally enhanced electricity grids; integration of clean energy sources).
- Materials (lithium and copper are needed for batteries in clean energy technologies).

Material Social Issues for an Institutional Investor

Outsourcing and Labor Practices

International outsourcing aims to reduce costs and increase efficiency to increase profit margins. Outsourcing partners take over workloads in manufacturing, operational roles, and customer service functions, usually in low-cost labor countries.

Social issues for institutional investors include the following:

- Exploitation of workers.
- Lax employment regulation.
- A lack of unions to protect employees.
- Forced employee overtime.
- Poor working conditions.
- Health and safety practices.
- Equality and human rights.

The **reputational damage** from being associated with the exploitation of local workers is an important risk, sometimes termed **headline risk**. This is especially important with direct international investments in such countries where the institutional investor is both an owner and managing the business. This reputational damage can be costly, leading to consumer boycotts, aggressive action groups, fines, and the enforced switching of supply chains.

Manufacturing and technology brands such as Nike, Apple, and Samsung have all been accused of labor management issues.

Fair and Just

Respecting and protecting the rights of employees in all countries is termed the **“just” transition**. In developed countries, laws and regulations exist to ensure fairness and justice for all, and to prevent the exploitation of the vulnerable. These formal protections often do not exist in developing countries.

As economies transition to low and zero carbon, industries such as coal mining may see the displacement of workers and negative impacts to local communities. In this context, a “just transition” will encourage a dialogue between workers, employers, and policymakers to minimize the human impact and to provide support to those affected.

Sustainable Development

The term “sustainable development” means meeting the needs of the current generation while protecting resources for future generations. This is a familiar concept at Level III as we discuss intergenerational equity [i.e., being fair to both current and future generations (endowments and foundations)]. The context here is sustainability for society as a whole.

The United Nations introduced 17 sustainable development goals in 2005 as part of its 2030 agenda for sustainable development. The goals include commitments to meeting 169 targets across the following areas:

1. No poverty, zero hunger, good health and well-being, quality education.
2. Gender equality, clean water and sanitation, affordable clean energy.
3. Decent work, industry and infrastructure, reduced inequalities, sustainable cities.
4. Responsible consumption and production, climate action, life below water, life on land.
5. Peace, justice, and strong institutions, partnerships for the goals.

Transition to Sustainable Economies

Since the industrial revolution, carbon-intensive industries have developed and expanded, having negative impacts on the world’s natural capital.

The world’s natural capital includes:

- Air and water.
- Soil geology.
- All living things.

These carbon-intensive industries have been a key driver of climate change.

Transitioning to a sustainable economy aims to protect the world’s natural capital, limiting negative impacts on the environment and confronting social inequities. Creating a “just transition” in the change that lies ahead will help people, regions, and countries adapt to a zero-carbon future.

Institutional investors are increasingly engaging with firms on ESG issues, assessing transition plans, reviewing business models, considering climate scenarios, and identifying the firms that are best and worst placed to prosper in the change that lies ahead.



MODULE QUIZ 12.3

1. Which of the following is *least accurate* of the 2015 Paris Agreement on climate risk?
 - A. Agreed to limit global temperature rises to +2 degree Celsius versus 2015 levels.
 - B. Voluntary pledges from countries to reduce carbon emissions.
 - C. Insufficient current reductions in emissions to meet the Paris Agreement targets.
2. Which of the following is *least likely* to be an example of climate transition risk?
 - A. Insurers refuse to renew insurance on a coastal property.
 - B. Carbon regulation bans the sale of fossil fuel-powered automobiles from 2030.
 - C. Carbon taxes increase the cost of goods sold for a manufacturer.
3. **Explain** the concept of a “just” transition, and **identify** the type of risk associated with this concept.

MODULE 12.4: CASE STUDY



Video covering this content is available online.

LOS 12.c: Analyze and evaluate the financial and non-financial risk exposures in the portfolio strategy of an institutional investor.

LOS 12.d: Discuss various methods to manage the risks that arise on long-term direct investments of an institutional investor.

LOS 12.e: Evaluate strengths and weaknesses of an enterprise risk management system and recommend improvements.

Case Study Introduction and Background Information

You work as an analyst for a small sovereign wealth fund in Ruritania (R-SWF), reporting to the head of risk. The R-SWF investment committee is considering new **direct investments** in **private equity** and **infrastructure**. As part of your role, you are evaluating these potential investments and will have the responsibility for monitoring and reviewing any investments made moving forward. The committee has tasked you to review the R-SWF risk management system and recommend improvements.

Republic of Ruritania and the Discovery of Natural Resources

Twenty years ago, Ruritania found large deposits of valuable rare metals used in the manufacturing of computers and technology. Ruritania formed a sovereign wealth fund (R-SWF) to provide growth for future generations. A key goal of the “savings” sovereign wealth fund is to transform nonrenewable assets into diversified financial assets to **share wealth across generations**.

R-SWF Assets

R-SWF contains a diversified portfolio of fixed income, equities, and alternatives. R-SWF has both **direct investments** and investments made via **investment funds**. The alternative investments include private equity, real estate, and infrastructure.

Case Study Sections

The case study is broken down into three sections (referred to as scenes):

- **Scene 1: Today.** An investment committee meeting to discuss **two potential new investments**.
- **Scene 2: Three years later.** Investment committee meeting to discuss the investment performance of the two investments.
- **Scene 3: Two years after Scene 2** (i.e., 5 years from today). Additional information is provided on investment performance.

Scene 1: Investment Committee Meeting Today

Initial Case Facts (1.0)

- The investment committee is considering **two new direct investments** in **private equity** and **infrastructure**. You are supporting the head of risk in discussing the risks of the potential investments at the meeting.
- Investment 1—A **direct infrastructure investment** in an airport.
- Investment 2—A **direct private equity investment** in a beverage manufacturer.

The investment committee participants (and CFA Level III candidates) have the following background information.

- Memo 1A—Background on R-SWF's performance and asset allocation.
- Memo 1B—Details on the proposed **direct infrastructure investment**.
- Memo 1C—Details on the proposed **direct private equity investment**.



PROFESSOR'S NOTE

The background information that follows is part of the R-SWF due diligence process to evaluate these two new investment proposals. This due diligence data is available in advance of the upcoming investment committee meeting that you will be attending. All the case study documents contain many clues that link to the risk concepts and theory covered earlier in the reading. Remember your task is to identify the risks of the two investment proposals and review the strengths and weaknesses of the R-SWF risk management process.

Memo A—Investment Committee Meeting Memo 1.0

TO: R-SWF Investment Committee members
FROM: R-SWF Chief Investment Officer
RE: Investment Committee Meeting Agenda
Distribution: Head of Risk, Head of PE, Head of Equities, Head of Infrastructure, and LIH Candidates

MEETING AGENDA

- Review of Asset Allocation: Chief Investment Officer
- Review of Infrastructure Investment Opportunity: Head of Infrastructure
- Review of Private Equity Investment Opportunity: Head of Private Equity
- Risk review—Infrastructure Opportunity: Head of Risk + All
- Risk review—Private Equity Opportunity: Head of Risk + All
- Summary and Actions: Chief Investment Officer

MEMO 1A—ASSET ALLOCATION BACKGROUND DATA

R-SWF Summary Data

- The Ruritanian Sovereign Wealth Fund was created 25 years ago.
- Latest AUM is \$50 billion.
- Over the 25-year time horizon, R-SWF has outperformed its benchmark by 150 bp net of fees.
- Since inception, the fund has experienced some short-term periods of underperformance.

R-SWF Current Asset Allocation

- Equities 40%
- Fixed Income 9%
- Alternatives 50%
- Cash 1%

Funding for the **two new direct investments in private equity and infrastructure** will come from a mix of cash, fixed income, dividends, and receivables. The asset/liability committee (ALCO) will determine the funding mix.

R-SWF Allocation: Alternatives

- Real estate 15%
- Hedge funds 10%
- Infrastructure 10%
- Private capital 10%
- Natural resources 5%

R-SWF Allocation: Private Capital

- Private equity funds 5%
- PE direct & co-investments 3%
- Private debt funds 1%
- Private debt direct 1%

R-SWF Allocation: Infrastructure

MEMO 1B—PROPOSED DIRECT INFRASTRUCTURE INVESTMENT

Overview of Investment Opportunity—Sunnyland Airport

Sunnyland is a frontier market, island nation, with beautiful beaches and a range of hotels. Tourism is currently constrained due to the small airport that can only support light aircraft carrying up to 10 passengers. The local government plans to expand the airport with a new terminal and runway, which will open up tourism to larger aircraft carrying up to 150 passengers. The terminal and runway will be located 2 km and 1 km from the sea, respectively.

R-SWF Sunnyland Airport Investment

- R-SWF is considering a **\$100 million investment** in a public-private partnership with the Sunnyland Airport Authority (SAA), on a build-operate-transfer (BOT) basis.
- This potential infrastructure investment of \$100 million **represents 0.2%** of the latest R-SWF AUM of \$50 billion.
- The Sunnyland Airport infrastructure investment (if undertaken) would represent **approximately 2% of total infrastructure assets** (i.e., \$100 million / \$5,100 million = 1.96%).
- The expected investment term is 25 years.
- The expected IRR over the full investment term is 15%.
- The R-SWF head of infrastructure believes the potential return on investment in the Sunnyland Airport infrastructure project far outweighs the potential risks.

Sunnyland Airport Project Costs and Funding

- Total project cost of \$500 million for the airport terminal (estimated to carry 5 million passengers per annum).
- **Airport operating group (AOG)** providing \$33 million of funding and will operate the airport under a fixed fee plus or minus a performance incentive.
- Nonrecourse project finance of \$300 million (70/30 debt/equity) with a 15-year term and 3-year grace period.
- **Two-year construction period** with a fixed price construction contract via tender process.
- A **25-year concession** in place with an investor consortium, with entitlements to collect commercial revenue (car parking, duty free, retail), as well as all regulated airport charges (passenger departure and landing charges). The terms of the concession require a payment of a quarterly concession fee of 35% of all revenue to the Sunnyland Airport Authority (SAA).
- Concession agreement requirement that the construction of the airport terminal meet quality and performance standards.

MEMO 1C—PROPOSED DIRECT PRIVATE EQUITY INVESTMENT

Overview of Investment Opportunity—Atsui Beverage Company (ABC)

The Atsui Beverage Company (ABC) is located in the tropical frontier market of Atsui. ABC is the only local manufacturer and seller of carbonated beverages in Atsui; all other beverages are imported. ABC is an unlisted company and is keen to raise funds to modernize its plant.

It is important to the founder of ABC to keep control of the company, and so it is only willing to sell a minority stake in the company to raise private equity capital.

ABC Financial Information

- Revenue for the last 12 months of \$50 million, and EBITDA of \$7 million. The R-SWF head of PE is optimistic about the **potential for significant improvement in revenue and efficiency** once the plant modernization is completed. **Modernization** will allow ABC to **expand the business** into noncarbonated sports drinks and juices.
- ABC estimates show that productivity will increase significantly once the plant is modernized. Central to the modernization plans is an estimated **40% reduction in the labor head count** from 500 to 300 local employees. This reduction in head count will bring **large cost savings** and future higher EBITDA margins.

Atsui Local Information

- Atsui is a landlocked nation, meaning that access to the nearest port is in another nation state via river transportation.
- ABC is located near a river and uses this method of transportation to the port. The **nearby river** is well known for its **unique biodiversity** that flourishes in the tropical climate of Atsui.

R-SWF Atsui Beverage Company (ABC) Investment

- The founder of ABC is offering R-SWF a **minority 35% stake** in the company in return for **\$25 million**.
- The ABC investment of \$25 million **represents 0.05% of R-SWF total assets** of \$50 billion and **0.4% of R-SWF total private equity assets** of \$6,025 million (including ABC).
- R-SWF is an experienced private equity investor in both direct and indirect forms of private equity investments. R-SWF is planning to increase its allocation to direct private equity investments, including co-ownership over the next 5 years.
- R-SWF has **two seats on the board of ABC**, which will expand from **five to seven members**. The head of PE plans to take one of these board positions on behalf of R-SWF and no decisions taken as to the second board member.
- The R-SWF head of PE recommends the proposed investment in ABC on the basis that the **potential returns far exceed the potential risks**.

Minutes of the Investment Committee Meeting 1.0

Participants:

- Chief Investment Officer
- Head of Infrastructure
- Head of Private Equity

- Head of Risk
- Head of Equities
- Analysts

Meeting Minutes

Meeting Key Purpose—Chief Investment Officer

To consider the proposed R-SWF infrastructure and PE investments in Sunnyland Airport and the Atsui Beverage Company and specifically discuss the risks of each

Sunnyland Airport Overview—Head of Infrastructure

- Summary of the proposition and background data provided to everyone in the background notes.
- The recent **build-operate-transfer (BOT)** analyst training received excellent feedback.
- Recap of the project financials: Overall airport project cost of \$500 million and a 2-year construction period. Our investment commitment would be \$100 million, representing 0.2% of AUM.
- The experienced airport operator, **AOG**, will be running the operation and contributing \$33 million of its own private equity.
- Balance of project capital (approx. \$300 million) from the local government in nonrecourse 15-year debt capital, with a 3-year grace period.
- Expected return on the R-SWF \$100 million investment over **25-year investment horizon** is estimated to be 15% IRR.
- Head of infrastructure has visited Sunnyland and noted the lack of natural resources to diversify its economy. **Sunnyland is heavily reliant on tourism**, hence, the need for the airport expansion project.

Atsui Beverage Company (ABC) Overview—Head of Private Equity

- Summary of the proposition and background data provided to everyone in the background notes.
- Head of PE discussed the recent trips to Atsui as part of the due diligence process. Of note was the discovery of a potentially strong product, the “**Mango Special**,” one of a series of **new noncarbonated drinks and juices** that can be expanded once the plant is modernized.
- Recap of the project financials: ABC is offering a **35% ownership stake** in return for a **\$25 million investment**. ABC advises that \$20 million of the R-SWF \$25 million investment will be used for modernization of its plant.
- Head of private equity recapped the efficiency savings from the planned reduction in head count and the potential increases in EBITDA from modernizing the plant, discussed in the background notes. In addition, the opening of the noncarbonated drinks markets, bringing in new revenue streams for ABC.

Risk Discussions on the Atsui ABC Investment: Clarifications from the Head of Private Equity

- **Risk to the cost savings.** Head of private equity clarified that the cost savings are contingent on reducing the workforce from 500 to 300. The chief investment officer suggested there is a risk that local unions and/or local politicians may oppose this reduction in headcount.
- **Reputational risk.** Such an adverse reaction to the modernization could lead to reputational risk for R-SWF and bring conflicts in Ruritania's relations with the Atsui government. Head of private equity explained the plans for community relations with both impacted employees and with the local community in Atsui. ABC will be investing heavily in staff training and development to help the transition.
- **Risk of local and foreign competition.** Question raised about the extent of local competition and the ability of foreign competitors to enter the Atsui beverage marketplace. Head of PE clarified that ABC is the sole beverage manufacturer in Atsui and that the local government applies high import tariffs that have been effective in limiting foreign competitors.
- **Risk of a change of government in Atsui.** Question raised about the upcoming elections in Atsui. Head of risk highlighted the risk that a change in administration may end import tariffs, bringing in foreign competition. The chief investment officer agreed that it is likely that Atsui will reduce import tariffs in the future.
- **Risk of a price war with foreign competitors.** Point made that if tariffs are reduced, large foreign beverage competitors could enter the Atsui beverage market and start a price war. Head of PE suggested ABC has **unique local beverages** such as the **Mango Special** that are popular in the local market. The foreign competitors do not compete with these product lines.
- **Question about exports.** Head of equities asked if ABC is planning to start exporting its products as part of its expansion plans. Chief investment officer advised that the neighboring markets are also tropical frontier countries, where beverages are still a luxury item. Transport to the nearest port is via a river, which does have the potential to open up sales to neighboring markets.
- **Risk of ABC management.** Head of risk raised a question about the **experience, skills, and education** of the **founder**, bearing in mind that R-SWF will only have a minority stake in the business with limited control. The risk of corruption was a follow-on point raised as a potential issue. Head of PE advised that R-SWF will be tracking progress carefully and directly involved in the modernization process. R-SWF has had **lots of co-investing experience** in working with management teams. R-SWF has two seats on the board. Also, extensive due diligence has been carried out with management, suppliers, and customers. Plans are also in place to **incentivize management** to ensure alignment to growth plans and strong oversight.

General Risk Discussions on Both Investments

- **Currency risk.** Head of risk raised the issue of currency risk in frontier markets in general. Volatility of the local currency against the dollar could lead to large losses from currency risk alone. Head of Infrastructure advised that the revenues from the Sunnyland Airport project would be largely in dollars, as customer pricing is geared toward international travel markets. Head of PE advised that dollars are widely used by visitors in Atsui.

- **Local borrowing.** Question raised about the **currency of local borrowing** for both frontier market organizations. Head of infrastructure advised that the \$300 million debt in the Sunnyland Airport project is denominated in dollars, as local banks do not have the lending capacity yet.
- **Default risk.** Head of risk raised the question of default risk on the borrowings of each organization to complete their respective capital projects. Head of infrastructure advised that the \$300 million debt raised in Sunnyland was **nonrecourse financing**, and the detailed concession agreement clearly outlined the terms of default.
- **Climate risk.** Head of equities identified the **medium to long-term climate risk impact of sea level rise** on the 25-year Sunnyland Airport investment, which is less than a kilometer from the sea. Over time and especially at high tides, airport operations may be impacted. Head of Infrastructure advised that drainage systems have been designed to handle projected climate impacts, and the engineers are confident of mitigation plans, based on 1-in-50-year and 1-in-100-year flood scenarios.
- **Local government relations.** Question raised about local relationships between Ruritania and the frontier markets, as both projects will need the support of local administrations. Both the head of PE and of infrastructure advised the projects had the support of the local governments.
- **Sunnyland Airport stress testing.** Head of risk asked about stress testing the assumed 15% IRR returns over the 25-year investment horizon. Risks identified included construction delays, penalties, budget overruns, and variances in revenues. Head of infrastructure discussed research completed of airport traffic scenarios, including **low, base case, and high customer traffic scenarios**. The low case 25-year IRR was in the region of 10%, and the high case was toward 20%. For cost overrun scenarios, a +/- 10% sensitivity has been factored in, which translates to a 25-year 13% IRR. The contracts pass any liabilities for delays or substandard work to the contractor.
- **Risk of a global recession.** Question raised from the head of equities about the impacts on tourism to frontier markets from a prolonged global recession. Sunnyland relies heavily on tourism and would be impacted by a downturn in discretionary spending. Head of infrastructure advised that historically during downturns, airlines have cut prices to stimulate demand and recovered relatively quickly.
- **Coronavirus pandemic and future pandemics.** Head of risk recapped the experience from the COVID-19 pandemic, especially the inability to travel due to restrictions from some locations. The risk of new variants leading to future pandemics and further travel restrictions would have the potential to limit or even halt all revenue for an extended period. Head of infrastructure advised that COVID-19 has resulted in updated contract terms with more emphasis on restructuring and rescheduling finance agreements to allow all parties time to recover from temporary travel restrictions.
- **Tourism portfolio correlation.** Head of PE asked for clarification of R-SWF portfolio exposures to tourism to avoid excessive concentration and sector correlations.

VOTING ON THE SUNNYLAND INFRASTRUCTURE INVESTMENT

■ Head of Infrastructure	YES
■ Head of Risk	YES
■ Head of PE	YES
■ Head of Equities	YES
■ Chief Investment Officer	YES

VOTING ON THE ATSUI ABC PRIVATE EQUITY INVESTMENT

■ Head of Infrastructure	YES
■ Head of Risk	YES
■ Head of PE	YES
■ Head of Equities	YES
■ Chief Investment Officer	YES

The investment committee approved investments in both projects.

Case Study Questions Based on Investment Committee Meeting 1.0

Question 1:

Evaluate the impact of adding *each* of the proposed investments to the liquidity risk of the R-SWF portfolio. **Justify** your answer.

Question 2:

A key risk in the Sunnyland airport investment is changing volumes of customer traffic. **Explain** and **describe** a form of analysis that you would implement to explore this risk and increase confidence prior to investing.

Question 3:

Explain the financial risks of the upcoming election in Atsui to the proposed private equity investment in ABC.

Answer 1:

The Sunnydale Airport investment of \$100 million represents 0.2% of R-SWF total assets and 2% of total infrastructure assets. The Atsui ABC investment of \$35 million represents 0.05% of R-SWF total assets and 0.4% of total private equity assets. The conclusion is that both proposed investments are relatively small and so will not affect overall portfolio liquidity.

In addition, both investments are direct investments providing a greater degree of control and discretion over investment exit plans. R-SWF also has a long time horizon and is a “savings sovereign wealth fund” with few contractual needs for income instead structured for growth.

The nature of the planned 25-year investment term in Sunnyland and in growing the business in ABC in Atsui makes each investment relatively illiquid in the short and medium term. However, at the R-SWF portfolio level, due to its relatively small size, liquidity risk is not affected by the addition of these two investments.

Answer 2:

The Sunnyland Airport project depends on attracting an increased number of tourists. Although airport capacity will increase from supporting only light aircraft able to carry a maximum of 10 passengers to supporting larger aircraft carrying up to 150 passengers, there is a key risk in the variability of customer traffic numbers.

A global recession leading to reductions in discretionary spending as well as travel restrictions resulting from future variants in a pandemic are risk factors impacting customer traffic. Scenario analysis will explore the impacts of changes to customer traffic resulting from a range of realistic scenarios. This scenario analysis should incorporate appropriate assumptions affecting frontier markets, as well as data from previous regional downturns and local data from the pandemic.

Each scenario should aim to quantify the financial impacts of variations in traffic on revenues, costs, and earnings, incorporating specific risks and local/regional contagion impacts on Sunnyland. Stress testing is recommended to explore breakeven points and critical customer number levels to maintain viable business models in the short, medium, and longer term.

Answer 3:

The approach is not sufficient to manage the financial risks resulting from a change of government in the upcoming elections. Under the current administration, heavy tariffs on foreign imports protect ABC from foreign competition, allowing it a virtual local monopoly. The CIO estimated that a relaxing of tariffs after the election is a fair assumption. Should this occur, ABC will find new larger entrants into its local market better able to compete on price. ABC does currently have unique local beverages; however, there is the risk of competitors creating similar alternatives once tariffs are reduced.

Scenario analysis is recommended to explore the impacts of a change in tariff, future relations with a changed local administration, and the impacts on regional and international competition prior to investing.

Scene 2: R-SWF Investments 2.0—Extension of Case Facts

Three years have passed since R-SWF made the two direct investments in Sunnyland and Atsui. The investment committee now **plans an investment review of the two projects**. Last month, the first stage of the review focused on financial performance, with the upcoming second stage of the review focusing on **current and potential future risks**.

The following data and updated project information is provided to all investment committee members and CFA Level III candidates.

- **Memo 2A:** Current R-SWF asset allocation and performance
- **Memo 2B:** Update on the Sunnyland Airport infrastructure project and risk discussion
- **Memo 2C:** Update on the Atsui ABC private equity project and risk discussion

Memo 2A—Investment Committee Meeting Memo 2.0

TO: R-SWF Investment Committee members

FROM: R-SWF Chief Investment Officer

RE: Investment Committee Meeting 2.0 Agenda

Distribution: Head of Risk, Head of PE, Head of Equities, Head of Infrastructure, and LIII Candidates

MEETING AGENDA

- **Review of Asset Allocation:** Chief Investment Officer
- **Review of the Sunnyland Infrastructure Project:** Head of Infrastructure
- **Review of the Atsui ABC Private Equity Project:** Head of Private Equity
- **Risk review – Infrastructure Opportunity:** Head of Risk + All
- **Risk review – Private Equity Opportunity:** Head of Risk + All
- **Other Risks:** Head of Equities
- **Summary and Actions:** Chief Investment Officer

MEMO 2A—ASSET ALLOCATION AND PERFORMANCE DATA

R-SWF Summary Data:

- 28 years since R-SWF inception.
- Latest AUM \$56 billion USD (previously \$50 billion).
- Over the 28-year time horizon, R-SWF has outperformed its benchmark by 130 bp net of fees (previously 150 bp).
- Since inception, the fund has experienced some short-term periods of underperformance.

R-SWF Updated Asset Allocation:

- **Alternatives** 51%
- **Equities: Emerging & Frontier** 22%
- **Equities: Developed** 17%
- **Fixed Income** 9%
- **Cash** 1%

A detailed breakdown and analysis of the current asset allocation was provided for the financial review last month.

Memo 2B—Sunnyland Airport Infrastructure Project—Update

Project Update

The **construction of the airport is complete**, with no material cost overruns. The Sunnyland government and airport authority are happy with the quality of the new

terminal and its potential to increase tourism.

A **grand opening** of the new terminal is planned for September, just before the start of the October to May tourist season. The airport operating group (AOG) managing the terminal is looking to renegotiate its management contract and raise management fees.

Climate Change

The new runway is only 1 km from the ocean, and concerns are increasing about the medium- to long-term **risk of a rise in sea level** due to climate change. **One-off weather events** such as storms are also increasing in frequency and intensity in the region.

In addition, Sunnyland has experienced hotter temperatures in recent years because of climate change. Previously, the local tourist season was October through May, with tourists avoiding the baking hot summer months. However, hotter May temperatures in recent years risk shortening the Sunnyland tourist season even further.

Risk Discussions on the Sunnyland Infrastructure Investment

Risks Identified:

- **Revenue risk** that airport traffic may be lower than previously estimated.
- **Service quality risk** of underperforming service quality standards, impacting customer experience and reputational risk.
- **Risk of higher than estimated operating and maintenance costs.**
- **Risk of default of AOG**, the operator of the Sunnyland Airport terminal.
- **Expropriation risk** of airport assets by the Sunnyland government.
- **Currency risk** when translating profits back to the reporting currency.
- **Interest rate risk** of future increases in borrowing costs.
- **Other risks** (e.g., climate risks).

Memo 2C—Atsui ABC Private Equity Project—Update

The modernization of the ABC plant is complete.

Economic Recession

Unfortunately, Atsui and the wider region are suffering from an economic recession that started last year. Because beverages are a luxury item, ABC revenues are down.

New Government and Lower Import Tariffs

The elections brought in a **change of government**, which has reduced foreign import tariffs from **100% to 20%**. Speculation is that the new government wants to attract foreign loan finance and reduce barriers to local markets.

Cost Savings and Efficiency

The original plan to **decrease headcount by 40%** has increased to **50%** due to lower revenues in the current recession. Cost savings are slow to realize due to the **strict employment laws in Atsui**, requiring 2-year notice periods. In a drive to cut costs, the

ABC management recently **cut employee breaks** from 1 hour to 30 minutes and **removed soap from the restrooms**, asking employees to bring in their own.

Dumping Waste in the Local River

To cut costs, ABC management has been **dumping waste in the nearby river** rather than paying for transport down river to the waste treatment plant. The local river has beautiful fishing and biodiversity, but the dumping of waste is starting to spoil the area.

Risk Discussions on the Atsui ABC Private Equity Investment

Risks Identified:

- **Elimination of import tariffs** no longer providing any protection against foreign competitors.
- **Shifts in market preferences** away from carbonated beverages to healthier alternatives.
- **Quality control** risks of products, services, and compliance with local regulations.
- **Local management risks**, as we are not in control of the operation, being a minority shareholder.
- **Expropriation risk** from the Atsui government.
- **Currency risk** when translating profits to the reporting currency.
- **Other risks** (e.g., climate risks).

Minutes of the Investment Committee Meeting 2.0

Participants:

- Chief Investment Officer
- Head of Infrastructure
- Head of Private Equity
- Head of Risk
- Head of Equities
- Analysts

Meeting Minutes

Meeting Key Purpose—Chief Investment Officer

Following last month's financial review of the Sunnyland Airport and Atsui ABC projects, we agreed to have an updated risk review based on our updated risk analysis.

R-SWF assets have grown by \$6 billion to \$56 billion over the last 3 years; however, the fund outperformance above benchmark fell from 150 bp to 130 bp due to recent difficulties in real estate markets.

CIO emphasized the growing importance of environmental and social risks and the **increased scrutiny on the fund** from outside observers.

Sunnyland Airport Project Update—Head of Infrastructure

New Airport Terminal

- The new Sunnyland Airport terminal is fully completed and has had great reviews both locally and internationally.
- The construction phase experienced delays beyond the estimated 2-year construction plan, resulting in cost overruns, which according to the contract are liabilities for the contractor. To date, some of the delay penalties are still to be paid and discussions continue with the contractor, the airport operator (AOG), and the government over cost allocations moving forward.
- The official launch of the new terminal is late August, ready for the October through May visitor season. Early bookings are in line with our expectations for Year 1.

Climate Change

- Head of risk made the point that **concerns about the effects of climate change** directly impacting Sunnyland Airport **have increased in the last 3 years**.
- Head of infrastructure advised that the **assumptions used** in the original environmental impact assessment scenarios **have changed**. The original assumptions provided some comfort that rising sea levels and the impact of severe on-off weather events would be at a manageable level. Current discussions with the government in Sunnyland are that the island may need to construct flood barriers, where the cost and effectiveness is still largely unknown.
- Head of equities suggested that **all businesses on the Island** would require **protection from flooding** from sea level rise. This may lead to many joint funding projects and government intervention.
- Head of infrastructure suggested that **new climate taxes** might need be imposed in Sunnyland to cover the costs of constructing flood barriers.

Higher Airport Terminal Management Costs

- Head of infrastructure advised that AOG, the airport operator, has signaled it wants to **negotiate an increased fee** to operate the terminal. Important to have a concession agreement that aligns all interests when the airport traffic begins to rise. Risk that AOG wants out of the contract and leaves us with the problem of finding a new operator.

Atsui ABC Project Update

Modernized Plant but Many Challenges—Update From Head of PE

- The modernization of the ABC plant is now completed. Atsui is in the **middle of a recession**, which has resulted in a devaluation of its currency and **drop in the demand** for ABC beverage products.
- Following the recent elections, the new administration plans to **reduce tariffs on imports** from 100% to 20%, taking away ABC's competitive price advantage
- The planned efficiency savings from reducing head count are slow to materialize, as Atsui employment rights require up to a 2-year notice period for employees. Because of the recession, ABC management plans to lay off up to 50% of its workforce rather than 40% as originally planned. This brings **reputational risk** for R-SWF being associated with significant layoffs in frontier markets.

- ABC has been **dumping waste in the nearby river**, rather than paying transportation for waste treatment, as a way to cut costs. The river has a **unique natural biodiversity**, including a very rare reptile. The actions of ABC are beginning to attract the attention of locals and environmental scientists who are noticing changes to the river.
- ABC management, in an effort to cut costs, has **restricted employee breaks** from 1 hour to 30 minutes and has **removed soap from the restrooms**, requiring employees bring their own soap to work.

Time to Exit the ABC Investment?

- Head of risk raised concerns over reputational risk. While the investment in ABC is not significantly large, the **reputational risks** of being associated with health and safety, social justice, and environmental pollution issues are very significant and potentially very damaging. It is time to exit!
- Head of PE acknowledged the risks raised but suggested retaining the ABC investment.
- CIO discussed the role of educating ABC management in environmental, social, and reputational risks.
- Head of equities also outlined that it is necessary to change the focus of the ABC management incentives, **away from cost cutting**, to instead **incentivize quality management practices**. The question remains as to whether the founder and majority shareholder will be open to changing their management practices if this increases costs.
- Head of equities suggested that if the investment is retained, discussions must open up with the Atsui government. The Atsui government policies of reducing tariffs on imports and mandatory 2-year redundancy periods may lead to the ultimate closure of the ABC factory unless a workable rescue plan can be established.
- CIO acknowledged the **headline risk** of Ruritania being widely reported as associated with the mistreatment of Atsui ABC employees, environmental pollution, and social injustice in this current recessionary environment.

Atsui ABC Investment—Head of Risk Summary

- Engage with ABC management; change the mindset away from just cost cutting to measures of quality that incorporate the ESG risks we have discussed.
- Lobby the Atsui government on the tariffs and 2-year notice period to see if they will help ABC.
- Review progress in 1 year. If no progress, time to look for the exits.
- CIO thanked the head of risk for this summary.

Sunnyland Airport Investment—Head of Equities Summary

- Engage with the Sunnyland government about its plans to adapt to climate change.
- This is a long-term investment; the effects of climate change will intensify with rising sea levels and warmer summers.

- Engaging with the government and the wider community, including the local business leaders and local people, is the way forward.

Case Study Questions Based on Investment Committee Memo 2.0

Question 4:

You are asked by the chief investment officer to **describe** how the following risks will be managed for each investment.

- Shift in market demand toward healthier foods and the reduction in demand for carbonated drinks in Atsui
- Risk that future interest rates will be higher than expected, resulting in higher borrowing costs for the Sunnyland airport project

Question 5:

Identify the primary environmental risk for the investments in Sunnyland Airport and in the Atsui Beverage Company. **Recommend** how each risk can be managed by R-SWF.

Question 6:

Identify a material social risk that applies to both investments that was not identified by the investment committee. **Discuss** how the risk should be managed.

Answer 4:

Shift in customer preferences

ABC can hedge this risk by continuing to diversify its product range to include healthier alternatives. The popular Mango Special is a good example of a locally developed, successful, healthy, noncarbonated beverage. ABC should leverage its experience in beverage product development using natural ingredients and widen its range of natural, healthy product offerings. Investing in research and development, trialing new products, and working closely with customers will help ABC anticipate changes in consumer tastes and market demand.

Protect against rising interest rates

R-SWF should consider hedging its interest rate exposure in the Sunnyland project. Both up-front and opportunity costs of hedging should be incorporated into the analysis, along with any cash flow impacts of hedges. The choice of financial instruments to hedge interest rate exposures in frontier markets is likely to be more limited.

Answer 5:

Sunnyland Airport

The primary environmental risk affecting the investment in Sunnyland Airport is the impact of climate change. First, a rise in sea level (chronic physical climate risk) may

affect the airport runway and terminal, potentially disrupting operations, as the airport is less than 1 km from the sea.

This risk of flooding and disruption will increase at high tides. Bearing in mind the long-term nature of this R-SWF investment in Sunnyland, there is a risk that if the rise in sea level is significant over time, the airport could no longer operate safely; worst-case scenario is that the airport would need to close. The Sunnyland data also acknowledges an increasing frequency and severity of one-off (acute physical climate risks) weather events such as storms. Planes are not able to take off and/or land in severe storms, so the airport traffic disruptions will likely increase due to climate change over time.

Recommended that R-SWF engage with the key stakeholders in Sunnyland, such as the local government, the airport operator, and business and community leaders, to understand Sunnyland plans to combat climate change. It is likely that a number of large-scale government-led adaption initiatives such as building flood barriers will be needed. Recommended that R-SWF use scenario analysis to explore the impacts of climate change. The rising sea level can't be mitigated by R-SWF, but plans can be put in place to adapt working with the government and the local community.

Atsui ABC

The primary environmental risk affecting ABC is its dumping of waste into the river. This recent management-led cost-cutting practice is already changing the river, known for its unique biodiversity, beauty, and rare wildlife. ABC is already attracting the attention of scientists and other environmental groups concerned about the river, bringing potentially damaging reputational risk for R-SWF being associated with polluting the river and destroying the environment. Potentially, any cost savings may be soon be lost if ABC is charged with cleanup costs, potential fines, and reputational damage.

Recommended that R-SWF engage with ABC management to stop this practice. Important to find alternative environmentally friendly ways to deal with waste. To minimize the environmental and reputational damage, assess the cost/benefit of a cleanup operation to restore the river. Educate ABC management in sustainable development and a "just" transition in environmental and social working practices. Discuss with ABC management the introduction of positive management incentives to align interests and reward sustainability in ABC. As R-SWF only has a 35% minority stake in ABC, there is a risk that the founder does not buy in to these concepts. R-SWF must communicate the previously mentioned risks to ensure that the waste dumping stops. By engaging with ABC to make these changes, R-SWF will align with its own ESG investment objectives.

Answer 6:

Reputational risk

Reputational risk is significant for both investments. Reputational risk may be easy to identify but very difficult to quantify and manage.

ABC reputational risk

ABC management's cost-cutting practices are introducing significant reputational risk, both for ABC and R-SWF. First, dumping waste into the river, polluting the local environment, damaging an area of unique biodiversity home to rare wildlife is already attracting the attention of locals, environmental scientists, and other groups. The ABC actions could well damage relations with the community, which uses the river as a popular fishing spot, and attract fines, penalties, and cleanup costs.

The potential reputational damage from negative publicity to both ABC and R-SWF is far greater. ABC relies on customers from its local markets. There is a risk of negative reactions to ABC from polluting the local environment, repercussions from the local people who buy their products, and from community groups and from the government. Second, there is risk of reputational damage to R-SWF from being associated with environmental pollution and destroying the habitat of rare wildlife.

A second area of reputational risk for both ABC and R-SWF is social issues connected to the treatment of the ABC workforce. Cutting 50% of the workforce will have a major impact on the local community. ABC does not have any plans in place for a "just" transition to engage with staff and community leaders to help minimize disruption.

Management practices, such as cutting lunch breaks and removing soap from restrooms, bring reputational risk for both ABC and, especially, R-SWF. The R-SWF CIO termed this "headline risk," making the headlines for the wrong reasons (i.e., being associated with social injustice, health and safety and/or human rights issues would be extremely damaging). The focus instead should be on retraining staff and introducing incentives to ensure quality sustainable management practices.

Sunnyland reputational risk

The impact of sea level rise due to climate risk can be damaging to the reputation of R-SWF in a number of ways. First, R-SWF must be actively engaging with the local stakeholders, such as the government, the airport operator, and local communities, to show R-SWF is willing to participate in finding and implementing solutions. Failure to engage may bring reputational damage to these vital ongoing business relationships. The island as a whole needs to work together to find ways to adapt to climate change, and R-SWF, as an owner of the airport, needs to be actively involved.

A second aspect of reputational risk is for tourism in Sunnyland as a whole. If summers are becoming too hot, storms becoming more frequent and intense, and flights potentially becoming less reliable, will this impact the island's reputation with foreign visitors. These longer-term impacts of climate change may change tourist traffic. Finally, the quality of service standards, efficiency, and overall customer service experience at the new airport terminal will affect the reputation of Sunnyland as a tourist destination.

Scene 3: R-SWF Case Continues

Two years have passed since the 3-year review meeting, which means five years have now passed since the initial investments in Sunnyland and ABC.

Update on the Sunnyland Airport Infrastructure Investment

Revenues are down due to fewer tourists. Airport traffic has fallen to 50% below the base case forecast.

Costs have been rising due to commencing climate adaptation programs in Sunnyland. Costs are 50% higher than the base case forecast.

The outlook for the medium and long term is unfavorable.

Update on the Atsui ABC Private Equity Investment

R-SWF sold its 35% stake in ABC for \$27 million to an international beverage company.

R-SWF avoided any adverse reputational damage resulting from the investments in ABC.

Question 7:

Using evidence from the R-SWF case study, **evaluate** the strengths and weaknesses of R-SWF enterprise risk management processes. **Recommend** and **justify** improvements.

Answer 7:

R-SWF ERM strengths

Enterprise risk management requires a coordinated approach across an organization involving the senior managers to make strategic risk and return decisions.

R-SWF has successfully created this coordinated risk framework via its investment committee structure, involving all the heads of each asset class, together with the head of risk. The R-SWF committee members were all involved in identifying key risks and assessing the strategic risk and return of each investment proposition. In fact, all committee members had a vote on proceeding with each project. Further evidence of the strong risk focus, is the investment committee meeting 2.0, which was specifically to review updated risks of both investments.

As part of ERM, it is essential to have a strong independent risk function that challenges the business to consider key risks. Clearly, R-SWF has this in place, as the head of risk raised many risk issues at each meeting and strongly cautioned against the rising reputational risks of the ABC investment.

R-SWF was effective in providing relevant data and additional training to committee members to enable participants to make informed decisions. The meetings themselves welcomed contributions from all attending; even heads of other asset classes had their say. For example, the head of equities made some valuable

contributions to the climate risk discussions, illustrating the benefits for R-SWF of pooling risk expertise at the committee meetings.

R-SWF ERM weaknesses

First, environmental and social risks were not evaluated prior to investing. The due diligence background data for both projects did provide important clues to signal further investigations, which were not followed up. For example, plans to significantly cut employee head count in ABC brought issues of labor fairness, health, and safety, as well as social justice. The unique biodiversity of the local river and environment were identified in the initial briefing notes but were not recognized as risks at the pre-investment meeting.

These ESG issues were not considered in negotiations with ABC management about working practices and incentives. R-SWF should have engaged with the founder and agreed on sustainable management practices for the workforce and the environment. R-SWF should have avoided incentivizing cost cutting and rewarded quality in building a sustainable business model.

The Sunnyland Airport investment is highly dependent on tourist numbers. The scenario analysis exploring the impacts of scenarios was inadequate. In reality, tourist traffic was 50% down and costs were 50% up from base case assumptions in just 5 years. More detailed scenario analysis was needed, incorporating realistic assumptions. In addition, stress testing is recommended to explore the impacts of low frequency but high impact downturns in airport traffic. This would have helped R-SWF better understand the risks and make better decisions.

The due diligence to climate risk was also inadequate. Realizing the new airport terminal will be within 1 km of the sea and Sunnyland being a tropical island nation should have prompted further investigation. The initial engineering impact assessments relied upon by R-SWF proved to be inaccurate only 3 years later. R-SWF should have expanded its climate risk due diligence to include climate scenario analysis and stress testing prior to investing.

While the investment committee did identify many risks, there was little evidence of robust action plans to mitigate risks. The action plan should incorporate controls, as well as hedging and other risk transfer strategies. Finally, the plan should incorporate the environmental, social, and reputational risks mentioned previously.



MODULE QUIZ 12.4

1. **Identify**, for each investment, the *earliest* evidence that signaled potential environmental risks. **Explain** for each investment why the evidence selected signaled potential environmental risks.
(Only one example of evidence is required for each investment.)
2. **Identify**, for each investment, the *earliest* evidence that signaled potential social risks. **Explain** for each investment why the evidence selected signaled potential social risks.

(Only one example of evidence is required for each investment.)

KEY CONCEPTS

LOS 12.a

Focus on events that could prevent an organization from meeting its long-term objectives.

Financial risks: (1) market losses, (2) liquidity risk

Nonfinancial risks: (1) reputational, (2) operational risks, (3) environmental, social, and governance risks

Dimensions of risk: top-down and bottom-up analysis, returns-based and holdings-based, absolute and relative risk, long-term and short-term risk metrics, quantitative and qualitative techniques

Liquidity risks: define needs and sources for liquidity, in normal and crisis conditions

Illiquid assets: private equity, real estate, infrastructure

Appraisal valuations result in smoothed returns and volatility.

LOS 12.b

Universal owners are holders of large diversified portfolios. Universal owners are impacted both negatively and positively by externalities.

Physical climate risks arise from one-off weather events (acute physical risks—e.g., storms, floods, and heat waves) and gradual effects of climate change (chronic physical risks—e.g., rise in sea levels and temperatures).

Transition climate risks are driven by: (1) new carbon policy and regulation; (2) advances in clean technologies; (3) higher input costs; and (4) shifts in consumer preferences.

Portfolio assets can be adversely impacted by physical climate risk in vulnerable locations (e.g., sea level rise, increased heat waves). Businesses are also impacted by rises in temperatures affecting business models.

Climate change brings winners and losers: (1) winners profit in a zero carbon economy; and (2) losers with old business models may find assets stranded.

Climate transition strategies: (1) mitigation (avoid, withdraw from fossil fuels); (2) adaption (to zero-carbon business models).

Social risks: community relations, health and safety, labor standards, equality, and human rights.

“Just” transition: being fair and just to people affected by transition changes.

LOS 12.c

A key focus of the case study is the environmental and social risks for institutional investors. The case study background notes will provide important clues to signal a

variety of risks. Another risk associated with portfolio firms with alleged social or environmental issues is reputational risk.

LOS 12.d

Long-term direct investments in illiquid assets have both advantages and disadvantages:

Advantages: (1) control over assets (e.g., exits); (2) increased portfolio liquidity due to control of exits; (3) avoids paying fund management fees; and (4) access to more detailed information as a business owner

Disadvantages: (1) concentrated positions; (2) additional liabilities; (3) attracting, retaining, and compensating in-house expertise

Long-term indirect investments in illiquid assets also have advantages and disadvantages:

Advantages: (1) no need for in-house team and costs; (2) limited liability of funds invested.

Disadvantages: (1) pay fund management fees; (2) no control over portfolio assets; (3) lower liquidity due to no control over the timing of exits.

Managing liquidity risk requires a 5-step process: (1) establish liquidity parameters; (2) assess current liquidity; (3) develop a cash flow model to project future cash flows; (4) stress test liquidity needs; and (5) develop an emergency plan.

LOS 12.e

ERM framework includes: (1) board of directors; (2) chief investment officer; (3) investment committee; (4) risk function.

ERM risk management process includes: (1) identify risks; (2) measure risks; (3) manage and mitigate risks; (4) monitor risks; (5) risk reporting; and (6) strategic analysis and planning.

Investor policy statement contains the risk and return objectives and constraints of the investment plan.

Risk tolerance is set by the board and defined by: volatility, maximum drawdown, value at risk, and conditional value at risk, a.k.a. expected tail loss.

Quantitative risk methodologies include: (1) returns-based analysis; (2) holdings-based analysis; (3) scenario analysis; and (4) stress testing.

Other risk metrics include: liquidity risk parameters, active risk budgets, restrictions on leverage, and the use of derivatives.

Strategic asset allocation is implemented either internally or via third-party investment managers.

Recommend a suitable benchmark for public investments to measure relative returns and active risk.

Have regular portfolio monitoring, reviews, and implementation of agreed rebalancing strategies.

Based on what was previously listed, identify strengths and weaknesses in an enterprise risk management system and recommend improvements.

ANSWER KEY FOR MODULE QUIZZES

Module Quiz 12.1

1. **A** Indirect investments are via investment funds that provide no direct control of the timing of exits. Therefore, indirect forms of investment in private equity reduce portfolio liquidity. Indirect investments incur both annual management and profit-sharing fees (carried interest). Indirect forms of investment achieve higher levels of diversification and lower levels of concentrations from investing in a larger number of projects. (LOS 12.a)
2. **A** *Unsmoothed returns* have plentiful transactions, have no need for appraisals, and reflect accurate levels of volatility. *Smoothed returns* have few transactions, a need for appraisals, and put a downward bias on volatility. (LOS 12.a)
3. Direct investments in private asset classes require a dedicated and experienced in-house team. It is challenging and expensive to attract and retain the high-quality, in-house talent needed.

Direct investments in private asset classes may have higher concentration of risks due to challenges in scaling up portfolio investments to achieve higher levels of diversification. Higher concentration risks increase the idiosyncratic risks associated with each individual investment. (LOS 12.a)

Module Quiz 12.2

1. **C** The VaR significance level is 5%. An increase in the significance level, say to 10%, changes the VaR confidence level to 90%. The lower confidence level reduces the VaR estimate.

A decrease in the holding period will decrease the VaR estimate. However, VaR is an estimate of an unexpected loss rather than an expected loss, making that answer option inaccurate.

An increase in the confidence level, say from 95% to 99%, will increase the VaR estimate, as more extreme tail losses will be incorporated. Conditional VaR will also increase because this represents the average loss beyond the VaR. (LOS 12.e)

2. **A** The board of directors sets the risk tolerance, not the chief investment officer.

Maximum drawdown, value at risk, and conditional value at risk are all short-term risk metrics. Monte Carlo simulation is a long-term risk methodology.

Returns-based risk systems analyze the historic returns of investment managers. Holdings-based risk systems have access to all the portfolio holdings as part of

the analysis. Hedge funds often prefer to maintain confidentiality of portfolio holdings to protect proprietary investment strategies. As a result, returns-based risk systems will likely be preferred. (LOS 12.e)

3. The enterprise risk management process includes the following steps: (1) identify risks, (2) measure risks, (3) mitigate and manage risks, (4) monitor risks, (5) report risks, and (6) do strategic analysis and planning. (LOS 12.e)

Module Quiz 12.3

1. **A** The 2015 Paris Agreement agreed to limit global temperature rises to +2 degrees Celsius based on pre-industrial levels (not 2015 levels). The Paris Agreement has voluntary pledges to reduce carbon emissions called nationally determined contributions. Current levels of nationally determined contributions (voluntary pledges) are insufficient to meet the target set in the Paris Agreement (limiting global warming to +2DC). (LOS 12.b)
2. **A** Physical climate risk results from one-off weather-related weather events (acute physical risks) and gradual impacts of climate risk, such as rising sea levels (chronic physical risks). An insurer refusing to insure a coastal property is an example of chronic physical climate risk. Transition climate risk is failing to adapt or mitigate to the zero-carbon economy. Transition risk results in an outdated business model and possibly stranded assets (unable to monetize). Transition risk is driven by changes in carbon regulation (carbon taxes, carbon limits), new clean technologies, and shifts in consumer demand. (LOS 12.b)
3. **A** “just transition” relates to social risks. Fairness, justice, and equality are important principles for everyone. Business decisions can have impacts on employees, local communities, and entire towns and cities. “Just transitions” ensure that support and communication is provided to assist people impacted and minimize the negative impacts of transitions. (LOS 12.b)

Module Quiz 12.4

1. Memo 1B provided initial details of the Sunnyland Airport investment that contained important environmental risk signals.

The Sunnyland Airport and runway being located so close to the sea (2 km and 1 km) were important signals of the risk of sea level rise due to climate change. The chosen 25-year time horizon is also shown in Memo 1B. This signals the need for detailed climate scenario analysis to explore the chronic physical climate risk of sea level rises and the uncertainty that surrounds the scale, timing, and costs of impacts to mitigate such risks.

Memo 1C provided important environmental signals for the Atsui Beverage Company Investment. The due diligence information in this memo included the details that ABC is a landlocked country, relying upon a river that allows for transport to the port. The river has unique biodiversity, which immediately should trigger environmental discussions. Investing directly brings the potential for additional liabilities. Further investigations were necessary to identify

potential risks and the local regulations that may exist. Discussions should have taken place with the founder based upon this risk signal. (LO 12.c)

2. Memo 1B also signaled social risks present in the Sunnyland Airport project.

Local government and community relations are at the center of such an important infrastructure project. Memo 1B shows a wide range of parties being involved in the project (e.g., the government, the airport operator, the construction contractors, and R-SWF). This illustrates the social risks of working with multiple stakeholders, agreeing on approaches, and finding solutions when things go wrong. Later in the case, tensions did start to appear as the airport operator wanted to renegotiate its fee.

With the airport being so important to so many businesses, local people, industry groups, and investors, there is considerable social risk with the project. Worst case, if R-SWF falls out with the airport operator, who replaces them?

Alternatively, if relations worsen between R-SWF and the local government, investment assets could be expropriated or heavy local taxes introduced.

Memo 1C signals social risks connected with the ABC private equity investment.

First, the founder is worried about giving up control. This signals a need for discussions with the founder about agreeing to a business model, working practices, and the design of sustainable incentive programs. R-SWF should have ensured that ABC management practices are aligned to sustainable development standards, in the treatment of the workforce and the environment. It was later discovered that management practices were not aligned, and exploitation of the workforce and the dumping of waste illustrates R-SWF did not adequately explore these social risks when co-investing.

A second signal of social risks also contained in Memo 1C is the proposed dramatic reduction in the ABC head count from 500 to 300. This should have signaled further investigations into employee contract law, which would have revealed the required very generous 2-year notice period. R-SWF did not follow up on this, and the resulting delays caused considerable problems in capturing efficiencies. In addition, the scale of the planned reduction in head count in such a small local community will result in considerable social impacts to individuals and the wider community. The loss of local jobs, relationship with the community, brand reputation, and relationship with the government are all important social considerations. Planned changes should follow a “just transition,” where communities are consulted and supported throughout periods of change.

Note that only one piece of evidence to signal each risk was required.

(LOS 12.c)

TOPIC QUIZ: PORTFOLIO CONSTRUCTION

You have now finished the Portfolio Construction topic section. On your Schweser online dashboard, you can find a Topic Quiz that will provide immediate feedback on how effective your study of this material has been. The test is best timed; allow three minutes per question. Topic Quizzes are more exam-like than typical QBank questions or module quiz questions. A score of less than 70% suggests that additional review of the topics is needed.

READING 13

PORTFOLIO PERFORMANCE EVALUATION

EXAM FOCUS

Performance evaluation of a portfolio is important to managers, sponsors, and clients who need to quantify performance and understand key drivers of both risk and return. Some of the calculations in the reading, if done in full, can be extremely tedious and are best left to spreadsheets and software programs. For the exam, expect the calculations to be reasonable. Also expect a fair balance of testing on both the calculations and the qualitative concepts. There is a sizable amount of material in the reading that overlaps with previous readings as well as the subsequent reading on investment manager selection.

MODULE 13.1: PERFORMANCE EVALUATION



Video covering this content is available online.

In a large institutional portfolio, it is common to have multiple investment managers where decisions are made by both the fund sponsor as well as by individual managers within the fund that affect portfolio performance. Performance evaluation can deconstruct returns to quantify which decisions added or subtracted value for the fund.

The fund sponsor's perspective will capture all value added or lost, while the manager's perspective will focus only on what a manager did to add or lose value for the fund. The material presupposes a large investor (e.g., a pension fund, endowment, or foundation) selects several investment managers to meet their investment goals and objectives.

The objective of the reading is to provide the tools necessary to evaluate active investment decisions made by plan sponsors and portfolio managers.

Components of Performance Evaluation

LOS 13.a: Explain the following components of portfolio evaluation and their interrelationships: performance measurement, performance attribution, and performance appraisal.

Performance evaluation consists of three interrelated components that build upon each other:

- **Performance measurement** serves as the initial foundation phase and calculates both the return and the risk of the fund over specified time periods. It is imperative to determine, before any performance evaluation analysis, if the portfolio will be compared to a benchmark (relative performance) or to a target return percentage that is specified in advance by the portfolio manager (absolute performance).
- **Performance attribution** determines the key drivers that generated the account's performance. Performance attribution expands upon the risk and return that was quantified through performance measurement and explains how the return was achieved given the risk taken by the portfolio manager. Also, performance attribution can explain both relative and absolute returns.
- **Performance appraisal** determines whether the performance was affected primarily by investment decisions, by the overall market, or by chance. Performance appraisal combines output from both performance measurement and performance attribution to render a professional judgment on the quality of the performance. If a fund's performance is attributed to luck, we cannot expect the portfolio manager to exhibit similar returns in the future.

In summary, performance evaluation answers three questions regarding a portfolio's performance:

1. What performance did the fund achieve during the period (performance measurement)?
2. How did the fund manager achieve their performance (performance attribution)?
3. Did the fund manager achieve their performance via skill or luck (performance appraisal)?

Performance Attribution

It is crucial to analyze the results of performance attribution as part of the portfolio evaluation process. As data is becoming more readily available, performance attribution has become more frequently used by many types of industry practitioners, including individual clients, who want to better understand the portfolio manager's investment process. For performance attribution to be a useful tool, it is imperative that the attribution process account for all aspects of the fund's risk and return. An attribution that does not account for the total risk and return of the fund is misleading and cannot be relied upon for any meaningful analysis.

LOS 13.b: Describe attributes of an effective attribution process.

An effective performance attribution process includes:

- A reflection of 100% of the portfolio's return or risk exposure.
- The portfolio manager's current decision-making process.
- The active investment decisions taken by the portfolio manager.
- A full explanation of the portfolio's excess return and risk.

The attribution analysis must account for 100% of the portfolio's risk and return and adequately represent the portfolio manager's current investment process. If the fundamental investment process of the fund has recently changed, then that attribution analysis must be updated to reflect those changes in the investment process.

Performance Attribution—Return Attribution & Risk Attribution

LOS 13.c: Contrast return attribution and risk attribution; contrast macro and micro return attribution.

Return attribution evaluates the impact of the active portfolio management decisions on the fund's investment returns.

Risk attribution is the parallel of return attribution but analyzes the impact of the portfolio manager's active investment decisions on portfolio risk.

Risk is generally compared to the portfolio's appropriate benchmark, but it can also be calculated in absolute terms, independent of a benchmark. For example, a relative-based risk attribution analysis would not be appropriate for a portfolio manager who has predetermined an absolute target return investment goal. Unfortunately, many investors often compare their portfolio's performance to a widely quoted passive index such as the S&P 500. A widely quoted index may or may not be an appropriate benchmark for their portfolio.

After a 10-year bull market in the S&P 500, performance attribution is likely to become even more important as portfolio managers justify their performance and fees during periods of negative returns. An additional benefit of performance attribution is its function as a form of quality control when reviewing an active portfolio. Basically, did the fund manager do what they said they were going to do?

Micro Attribution vs. Macro Attribution

Performance attribution is extremely flexible and can be analyzed at both the fund sponsor and the individual portfolio manager level.

Micro attribution analyzes the portfolio at the portfolio manager's level and seeks to verify that the portfolio manager did what they said they would and to understand the drivers of the portfolio's return.

Macro attribution analyzes investment decisions at the fund sponsor's level; it's commonly used with institutional investing. Macro attribution quantifies the fund sponsors' decisions to deviate from their strategic asset allocation and the timing when they made those decisions.

Performance Attribution—Returns-Based, Holdings-Based, and Transactions-Based

LOS 13.d: Describe returns-based, holdings-based, and transactions-based performance attribution, including advantages and disadvantages of each.

The three main approaches to conducting performance attribution are returns-based, holdings-based, and transactions-based methods.

Returns-based attribution regresses total portfolio returns against major risk factors (for example, systematic risk, size, value) to identify the active bets of the manager and their impact on active returns.

Holdings-based attribution uses beginning-of-period portfolio holdings to assess the active sector/stock selection bets of the manager and their contribution to active return. This method does not adjust for portfolio changes made during the evaluation period; hence, the output may not fully reconcile to overall portfolio returns for a manager with high turnover. This mismatch is referred to as a “timing” or “trading” effect, which can be reduced by using shorter evaluation periods.

Transactions-based attribution improves upon the holdings-based attribution by including the impact of any trades executed during the evaluation period.

The selection of attribution method will be driven by the nature of the data available, the investment process of the manager, and the need for accuracy by the analyst. A summary of the advantages and disadvantages of the three methods is displayed in Figure 13.1.

Figure 13.1: Advantages and Disadvantages of Performance Attribution Methods

Method	Advantages	Disadvantages
Returns-based	■ Easy to implement ■ Does not require holdings data (useful for private funds—e.g., hedge funds)	■ Least accurate because does not consider underlying holdings ■ Returns data can be manipulated
Holdings-based	■ More accurate than returns-based because considers underlying holdings	■ Needs data on fund holdings ■ Mismatch due to trading effect—not appropriate for high turnover active funds with long evaluation periods
Transactions-based	■ Most accurate method	■ Highest data requirements ■ Highest complexity



MODULE QUIZ 13.1

1. Which component of performance evaluation attempts to determine whether performance was affected primarily by chance?
 - A. Performance appraisal.

- B. Performance attribution.
 - C. Performance measurement.
2. Which method of performance attribution is the *most* reliable?
- A. Returns-based.
 - B. Holdings-based.
 - C. Transactions-based.

MODULE 13.2: RETURN ATTRIBUTION



Video covering
this content is
available online.

LOS 13.e: Interpret the sources of portfolio returns using a specified attribution approach.

Arithmetic Attribution and Geometric Attribution

Arithmetic attribution calculations focus on the active return of a portfolio in a single period by subtracting the benchmark return, B , from the portfolio return, R . A problem with this approach is that single-period arithmetic active returns do not compound to equal active returns over multiple periods without a “smoothing” adjustment.

To demonstrate, consider the following returns data for a portfolio and a benchmark over two periods:

	Period 1	Period 2
Portfolio Return (R)	5%	5%
Benchmark Return (B)	3%	3%

If you invested \$100 in the portfolio over these two periods, you would end up with a portfolio worth $\$100 \times 1.05^2 = \110.25 and a two-period performance of 10.25%.

Comparing this to the benchmark ending wealth of $\$100 \times 1.03^2 = \106.09 , and its two-period performance of 6.09%, implies a two-period active return of $10.25\% - 6.09\% = 4.16\%$.

Note that an arithmetic attribution would calculate an active return of $5\% - 3\% = 2\%$ for each period. These arithmetic active returns of 2% do not compound to equal the two-period active return of 4.16%, because $(1.02^2 - 1) = 4.04\%$.

A solution to this problem is to use *geometric* attribution, which defines the periodic excess return of the portfolio, G , as a ratio rather than a subtraction:

$$G = \frac{1 + R}{1 + B} - 1$$

In our previous example, the two-period geometric active return is $1.1025/1.0609 - 1 = 3.92\%$, while each single-period geometric active return is $1.05/1.03 - 1 = 1.94\%$. These single-period geometric returns *do* compound across two periods because $(1.0194)^2 - 1 = 3.92\%$.



PROFESSOR'S NOTE

All the attribution models that follow in this reading are arithmetic models, which is representative of the fact that a vast majority of performance

appraisal practitioners use arithmetic attribution.

Equity Return Attribution—the Brinson Model

LOS 13.h: Identify and interpret investment results attributable to the asset owner versus those attributable to the investment manager.

The Brinson Model comprises two different, but very similar, performance attribution methods, referred to as the Brinson-Hood-Beebower (BHB) method and the Brinson-Fachler (BF) method.

The Brinson-Hood-Beebower (BHB) Method

We shall illustrate the **BHB method** through application to the following portfolio and benchmark data, relating to an institutional fund that has allocated to two external managers—a growth manager and a value manager. We will assess the value added/lost by the decision to allocate to these external managers in terms of how the manager's style performs relative to the overall benchmark, and how well the managers perform relative to their style.



PROFESSOR'S NOTE

As we shall see later in this reading, attribution of the value added by a fund sponsor's decision to allocate to asset classes, styles, and individual styles is referred to as a macro attribution.

Figure 13.2: BHB Model Example

Style	Fund Weight	Fund Return	Benchmark Weight	Benchmark Return
Growth Equity Style	75%	13%	60%	10%
Value Equity Style	25%	19%	40%	20%
Total	100%	14.5%	100%	14.0%

First, note some basic calculations. The total portfolio return is given by:

$$\text{portfolio return, } R = \sum_{i=1}^n w_i R_i$$

where:

w_i = portfolio weight of the i th segment (usually style, sector, or geography)

R_i = portfolio return in the i th segment

n = number of segments in the portfolio

In this case, the total portfolio return is calculated as $(0.75 \times 13\%) + (0.25 \times 19\%) = 14.5\%$.

Similarly, the total benchmark return is given by:

$$\text{benchmark return, } B = \sum_{i=1}^n W_i B_i$$

where:

W_i = benchmark weight of the i th segment

B_i = benchmark return in the i th segment

In this case, the total benchmark return is calculated as $(0.60 \times 10\%) + (0.40 \times 20\%) = 14.0\%$.

Note that the total active return of the portfolio is $R - B = 14.5\% - 14.0\% = 0.5\%$.

The BHB method breaks the total active return of the portfolio (0.5%) into three components: the allocation effect, the selection effect, and the interaction effect.

The **allocation effect** measures the value added/subtracted through the decision to overweight/underweight a segment versus the benchmark. It is calculated by multiplying the active weight in the segment by the passive benchmark segment return.

The allocation effect for segment i , A_i , can be formulated as:

$$A_i = (w_i - W_i) \times B_i$$

In this example:

- growth allocation effect = $(0.75 - 0.60) \times 10\% = 1.5\%$
- value allocation effect = $(0.25 - 0.40) \times 20\% = -3.0\%$
- total allocation effect = $1.5\% - 3.0\% = -1.5\%$

Note how the total allocation effect here is negative, indicating that the decision to overweight growth and underweight value was an incorrect decision in a period where the value style outperformed growth.

The **selection effect** measures the value added/subtracted through selecting investments in the portfolio different from those of the benchmark. It is calculated by multiplying the passive benchmark weight of the segment by the active return generated in the segment.

The selection effect for segment i , S_i , can be formulated as:

$$S_i = W_i \times (R_i - B_i)$$

In this example:

- growth selection effect = $0.60 \times (13\% - 10\%) = 1.8\%$
- value selection effect = $0.40 \times (19\% - 20\%) = -0.4\%$
- total selection effect = $1.8\% - 0.4\% = 1.4\%$

Note how the selection effect is positive in the growth style where the manager selected outperformed the growth benchmark; however, the selection effect was negative in the value segment due to poor performance of manager selected versus the value benchmark.

The **interaction effect** measures the impact on active return of the allocation and selection effects acting *together*.

The interaction effect for segment i , I_i , can be formulated as:

$$I_i = (w_i - W_i) \times (R_i - B_i)$$

In this example:

- growth interaction effect = $(0.75 - 0.60) \times (13\% - 10\%) = 0.45\%$
- value interaction effect = $(0.25 - 0.40) \times (19\% - 20\%) = 0.15\%$
- total interaction effect = $0.45\% + 0.15\% = 0.60\%$

Note that the interaction effect is positive in the growth segment because the portfolio was overweight a style where the manager selected by the portfolio outperformed. The interaction effect was also positive in the value segment because the portfolio was underweight a style where manager selection was poor.



PROFESSOR'S NOTE

It might not be immediately obvious as to what role the interaction effect is playing. It is required because the allocation effect is **purely** looking at the impact of going overweight/underweight segments (in this case style)—it ignores any selection ability. The selection effect is **purely** looking at the impact of picking the right investments (in this case allocating to outperforming managers)—it ignores any impact of overweighting/underweighting segments. The interaction effect is required because there will be a “compounding” together of the impact of selection and segment weighting. For example, a portfolio that is overweight a style in which superior managers were selected will outperform by more than the sum of the allocation and selection effects.

While the interaction effect might be the least intuitive of the three effects, it is worth noting that it is simply derived from the first term of the allocation effect multiplied by the second term of the selection effect.

A summary of the output of the BHB model is displayed in the following:

Style	Allocation	Selection	Interaction
Growth Equity Style	1.50%	1.80%	0.45%
Value Equity Style	-3.00%	-0.40%	0.15%
Total	-1.50%	1.40%	0.60%

Note the total value added = $-1.50\% + 1.40\% + 0.60\% = 0.50\%$, which matches the figure calculated at the beginning of the analysis for total active return.

The Brinson-Fachler (BF) Method

The BF method addresses a minor drawback in the way the BHB method calculates the allocation effect for individual segments of the portfolio. The allocation effect for segment i under the BHB method is potentially problematic because the sign of the resulting allocation effect does not automatically indicate whether the decision to overweight/underweight a particular segment of the portfolio was correct.

In the previous example, it should be obvious that it was a bad decision to overweight the growth style during the period because the style performed worse than the

benchmark as a whole (the passive return for the growth style was 10%, while the overall benchmark return was 14%).

However, under the BHB method, the growth-style allocation effect was calculated as $(0.75 - 0.60) \times 10\% = +1.5\%$. This positive allocation effect is potentially misleading because the decision to overweight the growth style was a bad decision and detracted from the active return of the portfolio. This can only be seen when we calculate the allocation effect for the value style to be $(0.25 - 0.40) \times 20\% = -3.0\%$ and aggregate to a total allocation effect of $+1.5\% - 3.0\% = -1.5\%$.

The BF model tweaks the way the allocation effect is calculated to address this drawback of the BHB model. Under the BF model, the allocation effect looks at the active weight in the segment multiplied by the passive benchmark return of the segment *relative to the overall benchmark*. This can be formulated as:

$$A_i = (w_i - W_i) \times (B_i - B)$$

Under the BF method, the allocation effect is calculated as:

- growth allocation effect = $(0.75 - 0.60) \times (10\% - 14\%) = -0.60\%$
- value allocation effect = $(0.25 - 0.40) \times (20\% - 14\%) = -0.90\%$
- total allocation effect = $-0.60\% - 0.90\% = -1.50\%$

Under the BF method, we can see more clearly that the decision to overweight growth was a bad decision. Note that the aggregate allocation effect of -1.50% remains the same under both the BHB and the BF approaches.

The selection effect and the interaction effect are calculated in exactly the same way under both the BHB and the BF methods.

A summary of the output of the BF model is displayed in the following:

Style	Allocation	Selection	Interaction
Growth Equity Style	-0.60%	1.80%	0.45%
Value Equity Style	-0.90%	-0.40%	0.15%
Total	-1.50%	1.40%	0.60%

Note that the only difference between the BF output and the BHB output is the individual growth and value allocation effects.



PROFESSOR'S NOTE

In practice, the BF model tends to be the more popular model.

Macro Attributions vs. Micro Attribution

Investment decisions for an institutional fund, such as a university endowment fund, will have investment decisions being made on many different levels.

It will have an investment committee at the top of its investment decision-making structure responsible for setting overall strategic asset allocation weights and overseeing internal investment staff. The internal investment staff of the endowment would be responsible for tactical deviations from strategic asset allocation and the

selection of external portfolio managers. Together, the investment committee and the internal investment staff would be referred to as the fund sponsor. Conducting a performance attribution on the decisions made by the fund sponsor is called a **macro attribution**.

The BHB and the BF model attributions in the previous section were macro attributions. They looked at the value added through the decisions made by the sponsor to overweight/underweight different styles of *manager* versus the benchmark and the value added by the sponsor's ability to select good *managers* in these styles.

Further down the investment decision-making structure are individual portfolio managers (either internal or external to the endowment) making decisions to overweight/underweight segments (e.g., substyle/sector/geography) of their portfolio to generate an active return. A performance attribution applied to these decisions made at the individual investment-manager level is called **micro attribution**.

For example, an expansion of the previous example might show that the managers made active bets on size (small-cap vs. large-cap stocks) as follows:

Figure 13.3: Micro Attribution Example

Style	Fund Weight	Fund Return	Benchmark Weight	Benchmark Return
Growth Equity Style	75%	13%	60%	10%
<i>Large-cap growth equities</i>	50%	15%	30%	8%
<i>Small-cap growth equities</i>	25%	9%	30%	12%
Value Equity Style	25%	19%	40%	20%
<i>Large-cap value equities</i>	25%	19%	40%	20%
Total	100%	14.50%	100%	14.00%

Using the BF model, the allocation effect for a micro attribution calculates the allocation effect of the *size* bets made by the growth and value managers. Recall that the allocation effect is calculated as:

$$A_i = (w_i - W_i) \times (B_i - B)$$

Applying this calculation to the active bets of the growth manager made with respect to size gives:

- large-cap growth allocation effect = $(0.50 - 0.30) \times (8\% - 14\%) = -1.20\%$
- small-cap growth allocation effect = $(0.25 - 0.30) \times (12\% - 14\%) = 0.10\%$
- total growth allocation effect = $-1.20\% + 0.10\% = -1.10\%$

The key takeaway from these calculations is that the growth manager allocated poorly by overweighting large-cap growth stocks when large-cap growth stocks underperformed the general benchmark.

Recall that the selection effect is formulated as:

$$S_i = W_i \times (R_i - B_i)$$

Applying this calculation to the active bets of the growth manager made with respect to size gives:

- large-cap growth selection effect = $0.30 \times (15\% - 8\%) = 2.10\%$
- small-cap growth selection effect = $0.30 \times (9\% - 12\%) = -0.90\%$
- total growth selection effect = $2.10\% - 0.90\% = 1.20\%$

These calculations show that good stock picking in the large-cap growth segment more than outweighed poor stock picking in the small-cap growth segment.

Recall that the interaction effect is formulated as:

$$I_i = (w_i - W_i) \times (R_i - B_i)$$

Applying this calculation to the active bets of the growth manager made with respect to size gives:

- large-cap growth interaction effect = $(0.50 - 0.30) \times (15\% - 8\%) = 1.40\%$
- small-cap growth interaction effect = $(0.25 - 0.30) \times (9\% - 12\%) = 0.15\%$
- total growth interaction effect = $1.40\% + 0.15\% = 1.55\%$

These calculations show that the growth manager benefited from overweighting large-cap stocks where they exhibited good stock-picking ability, and likewise benefitted from underweighting small-cap stocks where they exhibited poor stock-picking ability.

Applying similar calculations to the value manager yields the following results:

Figure 13.4: Micro Attribution Output

Style	Allocation	Selection	Interaction
Growth Equity Style	-1.10%	1.20%	1.55%
<i>Large-cap growth equities</i>	-1.20%	2.10%	1.40%
<i>Small-cap growth equities</i>	0.10%	-0.90%	0.15%
Value Equity Style	-0.90%	-0.40%	0.15%
<i>Large-cap value equities</i>	-0.90%	-0.40%	0.15%
Total	-2.00%	0.80%	1.70%

Some important points to note here:

- The total allocation + selection + interaction effect is $-2.00\% + 0.80\% + 1.70\% = 0.5\%$, which is the total active return of the portfolio. Note that this is the same as the macro-attribution output.
- The total growth equity style effects are calculated by summing the individual effects for large-cap growth and small-cap growth segments. These totals are not the same as the numbers calculated for the growth manager under the macro attribution; however they do aggregate to the same overall active return across all effects. (The sum of the growth manager effects under the macro analysis was $-0.60\% + 1.80\% +$

0.45% = 1.65%. The sum of the growth manager effects under the previous micro analysis is $-1.10\% + 1.20\% + 1.55\% = 1.65\%$.)

Micro attribution can be conducted on many different types of portfolio segments—for example, style, industrial sector, or geography. As the previous macro/micro attributions show, a manager's allocation and selection effects can be different if the attribution is performed along different types of segments. For example, a manager may have negative aggregate selection effect with respect to industrial sector and positive aggregate selection effect with regard to geography. This begs the obvious question: is the manager a good stock picker? The answer to that question lies in the decision-making process. If the manager constructs the portfolio along geographical lines, then the data show the manager to be a good stock picker. If sector selection is central to the manager's decision process, then the data are showing that the manager is a poor stock picker.



PROFESSOR'S NOTE

The curriculum goes on to apply the BF model to a portfolio segmented by sector, geography, and even individual security. In each case, the attribution is performed by applying the BF formulas in the same way as previously demonstrated to each segment of the portfolio. Some points to note:

1. In later attributions, the reading presents the selection and interaction effect together rather than individually. A shortcut to lumping together the selection and interaction effects is to use the formula for the previous selection effect with portfolio weights instead of benchmark weights: $w_i \times (R_i - B_i)$.

For example, in the large-cap growth equity segment in the previous micro attribution, the selection effect was calculated to be 2.10% and the interaction effect was calculated to be 1.40%. The sum of selection and interaction (3.50%) could be calculated quickly by basing selection effect on actual portfolio weights using the formula $w_i \times (R_i - B_i) = 0.5 \times (15\% - 8\%) = 3.50\%$.

2. When the micro attribution is conducted on a single stock, the allocation effect actually represents the selection effect (because an allocation to a single security is really a stock-selection decision), and the selection effect represents the market timing and transaction costs of the manager with respect to the individual security.

Equity Return Attribution—Factor-Based Return Attribution

In the previous section, we demonstrated that the BHB model calculates the attribution of security selection, asset allocation, and their interaction effects. It is common to analyze additional investment manager decisions to better understand an investment strategy. A frequently used attribution model is the **fundamental factor model**, where a portfolio's sensitivity to additional factors can be tested.

The **Carhart model** calculates the excess return from active portfolio management investment decisions by determining the impact on the portfolio due to the following factors: (1) market index (RMRF), (2) market capitalization (SMB), (3) book value to price (HML), and (4) momentum (WML). For more in-depth analysis, the Carhart model allows practitioners to remove the effects of known market factors to quantify the excess returns from active management decisions that are not accounted for in the Carhart model.

$$R_p - R_f = a_p + b_{p1}RMRF + b_{p2}SMB + b_{p3}HML + b_{p4}WML + E_p$$

where:

R_p = portfolio return

R_f = risk-free rate

a_p = alpha or return above the expected return for the portfolio's level of systematic risk

b_p = various portfolio factor sensitivities

RMRF = return on a value-weighted equity index above that of the one-month T-bill rate

SMB = small minus big, a size (market-capitalization) factor; equal to the difference between the average return on three small-cap portfolios and the average return on three large-cap portfolios

HML = high minus low, a value factor; equal to the difference between the average return on two high-book-to-market portfolios and the average return on two low-book-to-market portfolios

WML = winners minus losers, a momentum factor; equal to the difference between the return on a portfolio of the past year's winners and the return on a portfolio of the past year's losers

E_p = error term to capture the part of the portfolio return unexplained by the model

In applying the Carhart factor model, consider the attribution results for a portfolio manager's investment decisions.

Figure 13.5: Sample Carhart Factor Model Attribution

	Factor Sensitivity				Contribution to Active Return	
	Portfolio	Benchmark	Difference	Factor Return	Absolute	Proportion of Total
Factor	1)	2)	3)	4)	3) × 4)	Active
RMRF	0.98	1.00	−0.02	4.62%	−0.09%	−5.59%
SMB	−1.10	−1.00	−0.10	−2.06%	0.21%	12.46%
HML	0.30	0.00	0.30	4.30%	1.29%	78.01%
WML	0.09	0.05	0.04	8.75%	0.35%	21.17%
Factor tilts return					1.75%	106.05%
+ Security selection					−0.10%	−6.05%
Active return					1.65%	100%

Analyzing attribution analysis results is important in determining the manager's ability to consistently add value. To start the analysis, one can review either the portfolio or its benchmark. Looking at the benchmark (Figure 13.5, Column 2) the sensitivity to RMRF of 1 suggests that the benchmark is a diversified index. The negative coefficient

of the benchmark's sensitivity to SMB indicates the benchmark has a large-cap focus tilt. We can summarize the benchmark as large-cap blend (no tilt toward growth or value) that does not use momentum.

To analyze the investment decisions by the portfolio manager, review Column 1 (portfolio) and Column 3 (difference between portfolio and benchmark). The portfolio exhibits a value tilt but closely resembles the benchmark on the other factors.

The next step in the attribution analysis is to determine if the value tilt taken by the portfolio manager added or detracted value from the portfolio. From the factor sensitivities table, the value tilt contributed 1.29%, or over 78% of the total realized active return for the portfolio. The other effects were minor compared to the value tilt taken by the portfolio manager. Finally, the portfolio manager's effectiveness at stock picking (security selection) detracted slightly (−0.10%) from the portfolio's returns.

It is important to check if the portfolio manager's prospectus indicates that they follow a value-based strategy. If the prospectus indicates the manager is a growth investor, this was not demonstrated in the model attribution and further due diligence is required.

Factor-Based and Fixed-Income Return Attribution

LOS 13.f: Interpret the output from fixed-income attribution analyses.

Three common methods of fixed-income attribution include:

- Exposure decomposition—duration based.
- Yield curve decomposition—duration based.
- Yield curve decomposition—full-repricing based.



PROFESSOR'S NOTE

For the exam, candidates are not responsible for fixed-income attribution calculations but are responsible for interpreting the results from any of the fixed-income attribution methods.

Exposure Decomposition—Duration Based

The major active bets that a fixed-income manager could take to generate active return versus the benchmark are the following:

- Duration—for example, a manager that expects the yield curve to shift *down* would *increase* the duration of the portfolio versus the benchmark.
- Curve shape—a manager could position the portfolio to outperform by correctly anticipating a change in the shape of the yield curve—for example a steepening of the curve
- Sector selection—a manager that believes that corporate spreads will narrow, leading to corporate bonds outperforming government bonds, would increase exposure to the corporate bond sector.

- Bond selection—a manager could overweight individual bonds that are expected to outperform the benchmark.

An exposure decomposition partitions both the portfolio and the benchmark by weight into duration “buckets” (e.g., short/mid/long). For each duration bucket, the portfolio and the benchmark are also partitioned by weight into sectors (e.g., government/corporate). From here, the attribution analysis decomposes the active return of the manager into the sources previously listed for each duration bucket and each sector.

Figure 13.7 shows the breakdown of a hypothetical portfolio and its benchmark by weights, which would act as an input to an exposure decomposition attribution. The buckets are segmented into short and medium durations.

Figure 13.6: Fixed-Income Exposure Decomposition Analysis

Bucket	Duration
Short	2 or less
Medium	Greater than 2 up to and including 8

Figure 13.7: Exposure Decomposition Example

	Portfolio Weights			Portfolio Duration			Portfolio Contribution to Duration		
	Short	Medium	Total	Short	Medium	Total	Short	Medium	Total
Corporate	20%	45%	65%	1.20	7.30	5.42	0.24	3.29	3.53
Government	20%	15%	35%	1.40	6.90	3.76	0.28	1.04	1.32
Total	40%	60%	100%	1.30	7.20	4.84	0.52	4.32	4.84

	Benchmark Weights			Benchmark Duration			Benchmark Contribution to Duration		
	Short	Medium	Total	Short	Medium	Total	Short	Medium	Total
Corporate	25%	20%	45%	1.20	7.30	3.91	0.30	1.46	1.76
Government	31%	24%	55%	1.40	6.90	3.80	0.43	1.66	2.09
Total	56%	44%	100%	1.31	7.08	3.85	0.73	3.12	3.85

	Portfolio Weights			Portfolio Return			Portfolio Contribution to Return		
	Short	Medium	Total	Short	Medium	Total	Short	Medium	Total
Corporate	20%	45%	65%	2.10%	2.18%	2.16%	0.42%	0.98%	1.40%
Government	20%	15%	35%	3.00%	2.76%	2.90%	0.60%	0.41%	1.01%
Total	40%	60%	100%	2.55%	2.33%	2.42%	1.02%	1.40%	2.42%

	Benchmark Weights			Benchmark Return			Benchmark Contribution to Return		
	Short	Medium	Total	Short	Medium	Total	Short	Medium	Total
Corporate	25%	20%	45%	2.10%	2.18%	2.14%	0.53%	0.44%	0.96%
Government	31%	24%	55%	3.00%	2.76%	2.90%	0.93%	0.66%	1.60%
Total	56%	44%	100%	2.60%	2.50%	2.56%	1.46%	1.10%	2.56%

Note: Figures are rounded for presentation.

Key points to note here:

- The total return of the portfolio was 2.42%. The total return of the benchmark was 2.56%. The purpose of this attribution is to explain why the active return of the portfolio was $2.42\% - 2.56\% = -0.14\%$.
- The overall portfolio duration was 4.84, versus an overall benchmark duration of 3.85. This implies that the portfolio would outperform if the yield curve experienced a parallel shift down. The manager achieved this higher duration through having a higher total weight in the medium duration bucket (60%) versus the benchmark (44%).
- The manager was overweight corporate bonds in the portfolio (65%) versus the benchmark (45%). This implies that the manager expected corporate bond spreads to narrow, leading to corporate bonds outperforming government bonds.

From the inputs displayed previously, an attribution can be performed, the results of which are summarized in Figure 13.8.

Figure 13.8: Hypothetical Decomposition—Attribution Results

Duration Bucket	Duration Effect	Curve Effect	Total Interest Rate Allocation	Sector Allocation	Bond Selection	Total
Short	−0.15%	−0.16%	−0.31%	0.05%	0.00%	−0.26%
Medium	0.48%	−0.23%	0.25%	−0.13%	0.00%	0.12%
Total	0.33%	−0.39%	−0.06%	−0.08%	0.00%	−0.14%

Key points to note here:

- The higher duration active position of the manager generated positive outperformance of 0.33%. The manager was correct to extend the duration of the portfolio, which implies that the yield curve did indeed fall.
- 39 bps of active return was lost due to changes in the shape of the yield curve. Because the manager was overweight higher duration assets, this suggests that medium yields rose and short yields fell. This implies a steepening of the yield curve.
- 8 bps were lost because the manager overweighed the corporate sector. This implies that, contrary to the manager's expectations, corporate spreads widened during the period. This is also evidenced by the lower returns in the benchmark for corporate bonds than for government bonds.
- The manager did not engage in active bond selection during the period.

The duration-based exposure decomposition method allows simple presentation of the output of the attribution with relatively low data requirements. The model is usually used for marketing and client reporting where there is a high need to present results in a clearly understandable way.



PROFESSOR'S NOTE

Remember that the important thing here is to interpret the output of the attribution, not to perform calculations to derive the figures.

Yield Curve Decomposition—Duration Based

The total return of a bond can be decomposed into several different sources. These sources include the following:

- Yield or income—the return earned through collecting the coupon income
- Roll—the impact of time passing and the bond “rolling down” a stable yield curve
- Shift—the impact of a parallel shift in the yield curve estimated through duration and convexity
- Shape—the impact of a change in the yield curve, such as a change in slope or curvature
- Spread—the impact of a change in spread for either a sector, a specific security, or both

- Residual—unexplained movements due to the estimation involved in assessing the components previously addressed (in particular, duration and convexity)



PROFESSOR'S NOTE

The first three of these sources of return: yield, roll, and shift were calculated for an individual bond in the total return decomposition performed in the fixed-income section of the curriculum.

The duration-based yield curve decomposition decomposes the *active* return of a portfolio manager to these sources of return. For example, a manager with an overweight position in high-coupon, high-yield corporate bonds will expect to have a positive contribution to active return from the yield component due to the high coupon and the spread component due to a presumed expected narrowing of the credit spread. Note that should their holdings default on coupons, or spreads in fact widen, then these effects would be negative, indicating that the manager lost value versus the benchmark due to the overweight position in high-yield corporate bonds.

Duration-based yield curve decomposition requires more data showing that the exposure decomposition method and the calculations involve more operational complexity. As such, these models tend to be used by analysts and portfolio managers rather than for marketing or client communication.

Yield Curve Decomposition—Full Repricing

A full repricing yield curve decomposition is the most comprehensive form of fixed-income attribution. Instead of estimating the impact of active bets using duration and yields to maturity, the full repricing approach breaks down the active return of the manager using individual *spot rates* for cash flows occurring at different maturities. Recall that a spot rate is a rate of return earned by a single cash flow at a specified maturity.

The full repricing approach breaks the active returns of the manager down to the individual cash flows that generated the active returns. As such, it is the most precise of the three fixed-income attribution methods and can accommodate the broadest range of instruments and yield curve changes. The drawback of the full repricing method is that it is the most complex method and, therefore, is least likely to be easily understood by the recipient of the output.

Risk Attribution

LOS 13.g: Discuss considerations in selecting a risk attribution approach.

Selecting the most appropriate risk metric for attribution analysis requires an in-depth understanding of the investment process of the portfolio manager. It is critical to identify whether the portfolio manager follows a top-down or bottom-up investment process and to define the portfolio's appropriate benchmark.

While performance attribution is important in the overall portfolio analysis process, only looking at returns is insufficient to evaluate the complete investment process. The risk taken by the portfolio manager must also be analyzed to fully evaluate the investment management process. Risk attribution identifies the sources of risk taken by the investment manager that resulted in the fund's returns.

The following table summarizes investment process (row) and type of attribution analysis (column). The correct approach to risk attribution occurs at the intersection of the relevant row and column in the following table.

Investment Process	Type of Attribution Analysis	
	Relative	Absolute
Bottom up	Security's marginal contribution to tracking risk (tracking error)	Security's marginal contribution to total risk
Top down	Attribute tracking error to relative allocation and selection	Factor's marginal contribution to total risk and specific risk
Factor based	Factor's marginal contribution to tracking error and active specific risk	

Tracking risk (or tracking error) is the relevant risk measure to consider for relative attribution analysis, and the general objective is to determine the returns generated from active management and compare them to the amount of tracking risk assumed. For the bottom-up approach, each security in the portfolio has a marginal contribution to tracking risk, and that amount is multiplied by its active weight to determine the contribution to tracking risk. In contrast, the top-down approach takes a more macro approach and attributes active return to allocation; then it attributes tracking error to allocation and selection.

Absolute attribution analysis quantifies general risk arising from market, size, and style exposures and specific risk arising from stock picking. A common risk measure to use is standard deviation. For example, a bottom-up approach could be focused on selection decisions. Therefore, it would be necessary to obtain each security's marginal contribution to total risk—in other words, the change in portfolio standard deviation resulting from a small increase of the security holding in the portfolio. Taking the sum of the marginal contributions to total risk for all the securities and dividing by total portfolio risk will provide the overall risk contribution due to selection decisions.

Risk attribution provides insight into the amount of risk that was introduced into the fund. Risk attribution must be combined with return attribution to fully understand the portfolio manager's active investment decisions.



MODULE QUIZ 13.2

1. The following is an extract from a micro attribution analysis of one of the investment managers of the Hiatus fund:

Economic Sectors	Portfolio Weight (%)	Sector Benchmark Weight (%)	Portfolio Return (%)	Sector Benchmark Return (%)
Energy	8.38	7.72	3.55	3.32
Financial	15.48	13.42	1.66	1.10
Technology	17.89	22.01	3.21	3.18

*The overall benchmark return was 2.32%.

Using the previous table, **calculate** and **evaluate**:

(i) The allocation effect for the energy sector using the Brinson-Fachler model.

(ii) The selection effect for the financial sector.

(iii) The interaction effect for the technology sector.

Use the following information for Questions 2 through 4.

Patty McDaniel and Peggy Peterson are consultants to Sigma Advisors. Sigma manages funds for wealthy individuals and small institutions. McDaniel and Peterson have been asked by Sigma to develop a plan to evaluate investment manager performance.

As part of McDaniel's and Peterson's task, Sigma asks them to perform micro performance attribution on one of its managers, Frank Matson. Matson invests primarily in large-cap value stocks. Matson's performance relative to the appropriate benchmark is

shown in the following table.

	Portfolio Sector Weight	Benchmark Sector Weight	Portfolio Sector Return	Benchmark Sector Return
Agricultural	4.00%	6.00%	-2.00%	-1.00%
Capital goods	8.00%	9.00%	-4.00%	-5.00%
Consumer durables	32.00%	35.00%	2.00%	3.00%
Energy	6.00%	6.00%	8.00%	2.00%
Financial	20.00%	18.00%	6.40%	4.00%
Technology	16.00%	16.00%	2.60%	-2.00%
Utilities	12.00%	10.00%	4.00%	-2.00%
Cash	2.00%	0.00%	0.20%	
Total	100.00%	100.00%		
Portfolio plus cash return			2.90%	0.86%

- From the data in the table, does Matson demonstrate an ability to wisely allocate funds to the capital goods and/or financial sectors?
 - Yes, but only in the capital goods sector.
 - Yes, but only in the financial sector.
 - Yes, in both capital goods and financial sectors.
- Does Matson demonstrate an ability to select stocks in the consumer durables and/or technology sectors?
 - Yes, in both technology and consumer durables sectors.
 - Yes, but only in the technology sector.
 - No, he does not demonstrate the ability to select stocks in either sector.
- Does Matson demonstrate an ability to generate a positive return from interaction effect in the agricultural and/or utilities sectors?
 - Yes, but only in the agricultural sector.
 - Yes, in both agricultural and utilities sectors.
 - Yes, but only in the utilities sector.

MODULE 13.3: BENCHMARKING INVESTMENTS AND MANAGERS



Video covering
this content is
available online.

Liability-Based Benchmarks

LOS 13.i: Discuss uses of liability-based benchmarks.

A more frequent benchmark in institutional investing is the **liability->based benchmark**, which is likely to be used by fund sponsors and portfolio managers when a firm has a specific liability to pay in the future (e.g., a defined benefit plan). A liability-based benchmark focuses on the cash flows necessary to satisfy the liability and frequently limits the investment choices available to the portfolio manager (e.g., equity and fixed income only). Frequently used assets within a liability-based benchmark include nominal bonds, inflation-adjusted bonds, and high-quality stocks.

As an example of a liability, consider a defined benefit plan that requires future cash flows to fund future liabilities. Some of the plan features will likely impact the structure of the liability and therefore impact which assets the portfolio manager should select to meet those cash flows.

Such features include:

- How many years until the average number of workers will retire in the plan.
- How many workers have already retired and are drawing cash from the plan.
- The impact of inflation on the liabilities.
- The correlation between the company's operating profit (EBIT) and the plan assets.
- If the plan is frozen or has a terminal life.
- Any actuarial assumptions, including life expectancy and required discount rate for the plan.

Asset-Based Benchmarks

LOS 13.j: Describe types of asset-based benchmarks.

The *seven primary types of benchmarks* are as follows:

1. **Absolute.** An **absolute benchmark** is a return objective that aims to exceed a minimum target return. An example would be the minimum acceptable return (MAR) that is used in computing the Sortino ratio.
 - Advantage:
 - Simple and straightforward benchmark.
 - Disadvantage:
 - Absolute return objective is not an investable benchmark.
2. **Broad market indexes.** There are several well-known broad market indexes that are used as benchmarks (e.g., S&P 500 for U.S. common stocks).
 - Advantages:
 - Well recognized, easy to understand by clients, and widely available.
 - Unambiguous, generally investable, measurable, and may be specified in advance.
 - Appropriate to use if it reflects the current investment process of the manager.
 - Disadvantage:
 - Manager's style may deviate from the style reflected in the index (e.g., it is not appropriate to use the S&P 500 for a small-capitalization U.S. growth stock manager).
3. **Style indexes.** Investment-style indexes represent specific portions of an asset category. Four well-known U.S. common stock style indexes are (1) large-capitalization growth, (2) large-capitalization value, (3) small-capitalization growth, and (4) small-capitalization value.
 - Advantages:
 - They are widely available, widely understood by clients, and widely accepted.
 - If the index reflects the manager's style and it is investable, it is an appropriate benchmark.
 - Disadvantages:

- Some style indexes can contain weightings in certain securities and sectors that may be larger than considered prudent.
- Differing definitions of investment style can produce quite different benchmark returns, making them inappropriate benchmarks.

4. Factor-model-based. Factor models involve relating a specified set of factor exposures to the returns on an account. A well-known one-factor model (CAPM) is the market model where the return on a portfolio is expressed as a linear function of the return on a market index. A generalized factor model equation would be:

$$R_P = a_p + b_1F_1 + b_2F_2 + \dots + b_KF_K + \varepsilon$$

where:

R_P = periodic return on an account

a_p = "zero factor" term, representing the expected value of R_P if all factor values were zero

F_i = factors that have a systematic effect on the portfolio's performance;
i = 1 to K

b_i = sensitivity of the returns on the account to the returns generated from factor i

ε = error term; portfolio return not explained by the factor model

Some examples of factors are the market index, industry, growth characteristics, a company's size, and financial strength. The benchmark portfolio (normal portfolio) is the portfolio with exposures to the systematic risk factors that are typical for the investment manager.

The manager's past portfolios are used as a guide.

– Advantages:

- It is useful in performance evaluation.
- It provides managers and sponsors with insight into the manager's style by capturing factor exposures that affect an account's performance.

– Disadvantages:

- Focusing on factor exposures is not intuitive to all managers or sponsors.
- The data and modeling are not always available and may be expensive to obtain.
- It may be ambiguous because different factor models can produce different outputs, leading to misspecification.

5. Returns-based. Returns-based benchmarks are constructed using (1) the managed account returns over specified periods and (2) corresponding returns on several style indexes for the same periods. Those return series are submitted to an allocation algorithm that solves for the combination of investment-style indexes and most closely tracks the account's returns.

– Advantages:

- Generally easy to use and intuitive.
- Meets the criteria of a valid benchmark.
- Useful where the only information available is account returns.

– Disadvantages:

- The style indexes may not reflect what the manager owns or what the manager or client would be willing to own.

- Enough monthly returns would be needed to establish a statistically reliable pattern of style exposures.
- Will not work when applied to managers who change style.

6. **Manager universes.** The **median manager** or fund from a broad universe of managers or funds (that follows a similar investment process) is used as the benchmark. The median manager is the fund that falls at the middle when funds are ranked from highest to lowest by performance.

– Advantage:

- It is measurable.

– Disadvantages:

- Manager universes are subject to “survivor bias,” as underperforming managers often go out of business and their performance results are then removed from the universe history.
- Fund sponsors who choose to employ manager universes must rely on the compiler’s representations that the universe has been accurately compiled.
- They cannot be identified or specified in advance, so it is not investable; thus, it’s not an acceptable benchmark.

7. **Custom security-based. Custom security-based benchmarks** are designed to reflect the manager’s security allocations and investment process.

– Advantages:

- Meets all the required benchmark properties and all the benchmark validity criteria.
- Allows continual monitoring of investment processes.
- Allows fund sponsors to effectively allocate risk across investment management teams.

– Disadvantages:

- It can be expensive to construct and maintain.
- A lack of transparency by the manager (e.g., hedge funds) can make it impossible to construct such a benchmark.

Benchmark Selection

LOS 13.k: Discuss tests of benchmark quality.

It’s important to understand the properties that constitute a valid benchmark. A valid benchmark should possess the following seven characteristics, which should align the benchmark’s style and risk with that of the manager and provide the manager with an appropriate management objective:

1. **Specified in advance.** The benchmark is known to both the investment manager and the fund sponsor. It is specified at the start of an evaluation period.
2. **Appropriate.** The benchmark is consistent with the manager’s investment approach and style.
3. **Measurable.** Its value and return can be determined on a reasonably frequent basis.
4. **Unambiguous.** There are clearly defined identities and weights of securities constituting the benchmark.
5. **Reflective of the manager’s current investment opinions.** The manager has current knowledge and expertise of the securities within the benchmark.

6. **Accountable.** The manager(s) should accept the applicability of the benchmark and agree to accept differences in performance between the portfolio and benchmark as caused only by their active management.

7. **Investable.** It is possible to replicate the benchmark and forgo active management.

A portfolio return can be broken up into three components: market, style, and active management.

$$P = M + S + A$$

where:

P = investment manager's portfolio return

M = return on the market index

$S = B - M$ = excess return to style; difference between the manager's style index (benchmark) return and the market return— S can be positive or negative

$A = P - B$ = active return; difference between the manager's overall portfolio return and the style benchmark return

This relationship recognizes first that the manager's style benchmark can earn more or less than the market. Had the manager taken a passive position in a broad market index, the return on that index, M , would be an appropriate benchmark, and $S = 0$. Because the manager might specialize in a particular style, however, we add (if $B > M$, $S > 0$) or subtract (if $B < M$, $S < 0$) the difference between the benchmark and market returns. Finally, the return to active management, A , is the difference between the manager's portfolio return and the benchmark return and is attributed to active management.

EXAMPLE: Test of Benchmark Quality

A large-cap growth portfolio fell 11% in the first six months of the year. In the same period, a relevant large-cap growth index fell by 12% and the broad domestic equity index fell by 10%.

A client has expressed concern about the active return of the manager during the period, stating that they would have expected a skillful growth manager to outperform the broad market during the period.

Evaluate the validity of the concern of the client.

Answer:

The concern of the client is not valid, because the manager has performed well for a growth-style manager, even though underperforming the broad market during the period.

The incremental return to the large-cap growth style, S , for the period is equal to the return of the large-cap growth index (B) minus the return of the broad market index (M) = $-12\% - (-10\%) = -2\%$. This indicates that the growth style has been out of favor during the period and has underperformed the general market.

The return due to active management, A , is the return of the portfolio (P) minus the growth index return (B) = $-11\% - (-12\%) = +1\%$. This indicates that the manager

has outperformed the style-specific benchmark and therefore has positive returns to active management. This implies that the client's comment regarding active return is not valid. It is the style of the manager that has caused the portfolio to underperform the market, not the active return of the manager.

Benchmarking Alternative Investments

LOS 13.m: Describe problems that arise in benchmarking alternative investments.

Hedge Funds

Three general types of benchmarks could be considered for hedge funds: (1) broad market indexes, (2) risk-free rate, and (3) hedge fund peer universes. However, they present some problems.

Broad market indexes are not appropriate to use as a benchmark for hedge funds because hedge funds cover a wide range of investment strategies. In addition, hedge funds differ significantly from each other and can have wide asset allocation fluctuations in the long term, which makes the use of broad market indexes problematic. With hedge funds using leverage, short positions, and derivatives—plus their overall lack of liquidity, transparency, ability to monitor, and low or no correlation of returns with the broad market index—broad market indexes should not be used as a benchmark for hedge funds.

The risk-free rate with an added spread could be used for some hedge fund strategies that focus on arbitrage. The idea here is that the risk-free nature of arbitrage strategies should be matched with the risk-free rate as the appropriate benchmark. Any additional spread would take into account the incremental returns due to active management net of costs. Unfortunately, the vast majority of hedge funds will carry some systematic risk, and the use of leverage will only exacerbate the risk. As a result, the spread would need to be increased accordingly. Finally, as with broad market indexes, the lack of correlation of hedge fund returns and the risk-free rate makes the risk-free rate an unsuitable benchmark.

Hedge fund peer universes are not suitable because a specific peer group's risk and return objectives are not likely to match those of a specific hedge fund. Additionally, peer universes are subject to backfill and survivorship bias. Finally, because of the frequent illiquidity of underlying assets in hedge funds, current pricing may not be exact and may be based on an appraisal or prior period price. As a result, there may be a smoothing effect, which reduces the reported standard deviation, thereby increasing the Sharpe ratio and the allocation to hedge funds.

Real Estate

Many real estate benchmarks exist but they are not all suitable for real estate investments:

- The benchmarks are derived from a sample of the real estate universe, which means they are not completely representative of the real estate asset class.
- The performance of the index probably bears a very high correlation to the largest investments.
- Benchmark returns are self-reported, so some subjectivity and/or bias may be present.
- Benchmarks that are value-based could be biased toward the most expensive properties or geographical areas.
- The use of appraisal data (e.g., infrequent pricing) leads to a smoothing effect and understated volatility or risk.
- There is a lack of comparability with benchmark returns given that some benchmarks use leverage while others do not.
- The indexes assume no transaction costs, full transparency, and normal liquidity, which is usually not the case; those factors would impact actual real estate returns.

Additionally, there is lack of consistency in the use of return measures. For example, the cash inflows and outflows for open-end funds are controlled by the investor, so time-weighted returns would be used. In contrast, the cash inflows and outflows for closed-end funds are controlled by the manager, so an internal rate of return (IRR) would be used.

Private Equity

Benchmarks exist to allow for performance comparisons specific private equity funds and that of a relevant peer group. The metric used is usually IRR, taking into account all investment cash flows since inception plus the ending investment value. Key problems with such benchmarks include managers using different methods of valuation, which makes comparison more difficult. In addition, IRR may be biased by losses or gains occurring near the beginning of an investment. Finally, all the results are reported at one common point in time, even though the firms are likely in varying stages of development.

Commodities

Benchmarks for commodity investments are usually based on futures as opposed to actual assets. This may result in significant differences between the benchmark and the commodity investments portfolio, which reduces the comparability. Similar to other alternative investments, the different amounts of leverage employed by portfolios versus benchmarks—as well as the different weightings of exposures between portfolios and benchmarks—make the benchmarking process problematic for commodities.

Managed Derivatives

Managed derivatives funds, often referred to as managed futures funds, use specific derivatives trading strategies to generate returns. Benchmarks are either strategy-specific or peer group-based. An example of a strategy-specific benchmark is the Mount Lucas Management Index, which follows a basic momentum trading strategy. Peer-

group benchmarks are similar to those used for hedge funds and will potentially exhibit the same issues as hedge fund peer-group-based benchmarks such as survivorship bias.

Distressed Securities

Given the illiquidity and severe lack of marketability of distressed securities, it is almost impossible to determine an appropriate benchmark. Should the financial state of a distressed company become better, it may become more liquid. However, it is likely to require a significant amount of time to occur (if it even does) and that creates valuation problems (e.g., stale pricing).

Market indexes do exist such as the Barclay Distressed Securities Index; however, they may take into account numerous strategies so the suitability of indexes for a specific strategy is questionable. As well, the indexes may perform valuations at erratic intervals so the issue of stale pricing may not be solved.

Choosing the Appropriate Benchmark

LOS 13.I: Describe the impact of benchmark misspecification on attribution and appraisal analysis.

The phrase *garbage in, garbage out* is appropriate to use regarding the impact of benchmark misspecification on attribution and appraisal analysis. Useful performance evaluation (and any of its three components) requires an appropriate fund benchmark. When an incorrect benchmark is used in the performance evaluation process then performance measurement, which comprises attribution and appraisal analysis, will not be useful or provide valid information on understanding the investment process. Misspecified benchmarks will result in misfit active return.

To illustrate active return, suppose a manager invests in large and liquid French stocks. The sponsor assesses the manager's performance using the Euronext 100 Index. Although French stocks comprise the majority of the Euronext 100 Index, the Euronext 100 does include stocks from the Netherlands, Belgium, Portugal, and Luxembourg. As a result, the CAC 40 (large and liquid French stocks) would be more appropriate to label as the manager's normal portfolio. Assume the manager's portfolio return is 10%, the Euronext 100 (investor benchmark) return is 9% and the CAC 40 (normal portfolio) return is 12%.

Based on the returns provided, the manager outperformed the investor benchmark (10% versus 9%) but underperformed its proper benchmark (10% versus 12%). In other words, the misfit active return is +3% and the *true* active return is -2%.



MODULE QUIZ 13.3

1. Rhombus Asset Management (Rhombus) runs a U.S. small-cap equity portfolio. The portfolio generated an 8.9% return during 2005. Rhombus uses the Russell 2000[®] Index as the most appropriate benchmark. The Russell 2000[®] Index yielded 9.1% over the same evaluation period. The Wilshire 5000, a broad U.S. equity market index, yielded 8.5% over the same evaluation period.

Calculate Rhombus's return due to style and due to active management. **Assess** Rhombus's performance compared to the benchmark and to the market.

- Hexagon PLC is an investment management company based in London. It manages portfolios consisting of European equities only. It states that its benchmark is to beat the median manager. **Discuss** the validity of the median manager benchmark approach.

MODULE 13.4: PERFORMANCE APPRAISAL



Video covering this content is available online.

LOS 13.n: Calculate and interpret the Sortino ratio, the appraisal ratio, upside/downside capture ratios, maximum drawdown, and drawdown duration.

LOS 13.o: Describe limitations of appraisal measures and related metrics.

The final stage of the performance evaluation process is performance appraisal. Performance appraisal is designed to assess whether the investment results are more likely due to skill or luck.

Should we hire or fire the manager? Risk-adjusted performance measures are one set of tools to use in answering such questions. Active investment management skill is evident when the portfolio manager's investment process adds value on a risk-adjusted basis. In other words, can the fund manager outperform their appropriate benchmark on a risk-adjusted basis consistently?



PROFESSOR'S NOTE

Unfortunately, many investment managers have only a few years of performance to evaluate, which makes it extremely difficult to differentiate between luck and skill through the appraisal process. It is recommended to have many years of observations to determine at an appropriately high confidence level that the manager truly possesses superior investment skill.

The following seven appraisal measures will be discussed (the first five are risk-adjusted measures):

- Sharpe ratio.
- Treynor ratio.
- Information ratio.
- Appraisal ratio.
- Sortino ratio.
- Capture ratios (upside and downside).
- Drawdown (maximum drawdown, drawdown duration).

Sharpe Ratio

$$S_A = \frac{\bar{R}_A - \bar{r}_f}{\hat{\sigma}_A}$$

The Sharpe ratio is calculated as the incremental or excess return over the risk-free rate (numerator) divided by standard deviation (denominator). A key drawback with the ratio is that the denominator does not differentiate between volatility that is upside versus downside. Therefore, with the Sharpe ratio, there is a penalty for all volatility, even if it is “good” volatility.

Treynor Ratio

$$T_A = \frac{\bar{R}_A - \bar{r}_f}{\beta_A}$$

The Treynor ratio is similar to the Sharpe ratio, but the denominator for the former is measured by beta, so it only considers systematic risk rather than total risk like the latter. Therefore, with the Treynor ratio, the universe of appropriate benchmarks is limited to only those that assume efficient markets. The Treynor ratio is only useful in evaluating portfolios that have systematic risk and do not have unsystematic risk; in other words, such portfolios are well diversified.

Information Ratio

$$IR = \frac{E(r_p) - E(r_B)}{\sigma(r_p - r_B)}$$

The information ratio (IR) is used to measure a portfolio’s performance against the benchmark but accounts for differences in risk. The numerator is the difference between the mean returns of the portfolio and the benchmark, respectively. The denominator is known as the tracking risk, or the variability in the portfolio performance with that of its benchmark.

Appraisal Ratio

The appraisal ratio measures the ratio of active return, α , to the volatility of the residual term, σ_ϵ , both derived from a factor-based regression.

$$AR = \frac{\alpha}{\sigma_\epsilon}$$

A manager with a higher AR is generating more active return per unit of active risk (as represented by residual risk σ_ϵ also referred to as the “standard error of the regression”) and is therefore a superior active manager according to this measure.



PROFESSOR’S NOTE

The “standard error of the regression,” σ_ϵ is the volatility of the error term in a factor-based regression. As such, it represents the component of the volatility of manager returns that is not explained by the regression model

factors. This component of volatility is generated by the manager taking active bets relative to the factors in the model, hence σ_ϵ here is playing the role of active risk. You should not concern yourself with the direct calculation of σ_ϵ however, it can be deduced from basic portfolio and benchmark performance data as per the following example.

The AR is analogous to the information ratio—it looks at active return per unit of active risk. The only difference to the information ratio is that the AR uses a factor-based regression to estimate active return and active risk.

A common single-factor application is the capital asset pricing model (CAPM). Recall that under the CAPM, the fair return of Manager i is given by:

$$E(R_i) = R_f + \beta_i[E(R_m) - R_f]$$

where:

R_i = return of Manager i

R_f = risk-free rate

β_i = relative systematic risk

R_m = market return

Under the CAPM framework, α can be calculated as the difference between the forecasted return of the security and the CAPM fair return. It can also be shown that the variance of the manager, σ_i^2 , is driven partly by the systematic variance of the manager related to market variance, and partly by residual variance specific to the manager as follows:

$$\sigma_i^2 = \beta^2 \sigma_m^2 + \sigma_\epsilon^2$$

This implies that σ_ϵ can be deduced from:



PROFESSOR'S NOTE

If required to calculate residual risk in this way, be sure to remember to take the square root of σ_ϵ^2 before using it in the denominator of the appraisal ratio.

EXAMPLE: Appraisal ratio

Annualized data relating to the performance of an investment manager is presented in the following:

Portfolio return	8%
Portfolio standard deviation	20%
Portfolio beta	1.2
Market index return	6%
Market standard deviation	16%
Risk-free rate	1%

Calculate the appraisal ratio of the manager.

Answer:

The fair return of the manager according to CAPM is calculated as:

$$\begin{aligned}
 E(R_i) &= R_f + \beta_i [E(R_m) - R_f] \\
 &= 1\% + 1.2(6\% - 1\%) \\
 &= 7\%
 \end{aligned}$$

The alpha of the manager is equal to the portfolio return less the CAPM fair return = $8\% - 7\% = 1\%$.

Nonsystematic variance of the manager is calculated as:

$$\begin{aligned}
 \sigma_\varepsilon^2 &= \sigma_i^2 - \beta^2 \sigma_m^2 \\
 &= 0.20^2 - (1.2^2 \times 0.16^2) = 0.003136
 \end{aligned}$$

The appraisal ratio is calculated as:

$$AR = \frac{0.01}{\sqrt{0.003136}} = 0.18$$

Sortino Ratio

The Sortino ratio only considers the standard deviation of the downside risk. That is in contrast to the Sharpe ratio, which considers all risk (e.g., both upside and downside). Positive volatility associated with the upside can be considered “good” volatility.

In practice, however, clients tend to be more concerned about volatility associated with negative returns. As a result, the Sortino ratio can provide a more meaningful view of a portfolio’s risk-adjusted performance than the Sharpe ratio.

$$\begin{aligned}
 SR_D &= \frac{E(r_p) - r_T}{\sigma_D} \\
 \widehat{SR}_D &= \frac{\bar{r}_p - \bar{r}_T}{\hat{\sigma}_D}
 \end{aligned}$$

In the previous equation, the r_T refers to a target rate of return—sometimes called the minimum acceptable return (MAR)—and σ_D refers to target semideviation.

Semideviation measures the standard deviation of returns *below the target return*. In other words, the Sortino ratio penalizes managers only for “bad” volatility by considering only returns below the MAR; it ignores “good” volatility generated by returns above the target return. To calculate the semideviation of a series of returns, an analyst would sum the squares of the distances of returns below the target return, *ignoring those returns that beat the target return*. Dividing by the *total* number of observations (*including* those above the target return) gives semivariance. The square root of this number is the semistandard deviation.

Therefore, assuming an average portfolio return of 7%, MAR of 3%, and semi-standard deviation of 5%, the Sortino ratio is calculated as $(7\% - 3\%) / 5\% = 0.80$. Similar to the Sharpe ratio, the higher the Sortino ratio, the better the risk-adjusted performance.

The Sortino ratio is more appropriate for investments with non-normal (nonsymmetrical) return distributions. Positively skewed and negatively skewed investment strategies would both result in lower Sharpe ratios (e.g., higher standard

deviation in the denominator), but only the negatively skewed investment strategy would result in a lower Sortino ratio (e.g., higher semi-standard deviation in the denominator). Therefore, for investments that have nonsymmetrical or skewed return distributions, such as hedge funds or options, the Sortino ratio appears to be a more appropriate performance metric. However, a comparability problem exists with the Sortino ratio because the determination of MAR is subjective and specific to each investor.

Capture Ratios

Capture ratios determine the manager's relative performance when markets are up or down. Consider an up market where the index or benchmark return is positive. The question is whether the manager's portfolio return is also positive and if it is above or below the benchmark return. For example, if the benchmark return is 4% and the portfolio return is 5%, the upside capture ratio is 125% ($5\% / 4\% = 1.25$) and there is outperformance during a period of positive returns. Assuming the same benchmark return but a portfolio return of only 3%, the upside capture ratio is 75% ($3\% / 4\% = 0.75$) and there is underperformance during a period of positive returns.

Similarly, consider a down market where the index or benchmark return is negative. For example, if the benchmark return is -4% and the portfolio return is -5%, the downside capture ratio is 125% ($-5\% / -4\% = 1.25$) and there is underperformance during a period of negative returns. Assuming the same benchmark return but a portfolio return of -3%, the downside capture ratio is 75% ($-3\% / -4\% = 0.75$) and there is outperformance during a period of negative returns.

One can now calculate the capture ratio (upside capture divided by downside capture). Using the previous examples with benchmark returns of +4% and -4% and portfolio returns of +5% and -5%, the capture ratio is $1.25 / 1.25 = 1$. A capture ratio of 1 is indicative of a symmetrical return profile. Therefore, if the capture ratio > 1 , then there is a positively asymmetrical (convex) return profile in that there is greater upside capture than downside capture. Correspondingly, if the capture ratio < 1 , there is a negatively asymmetrical (concave) return profile in that there is greater downside capture than upside capture.

For example, during an up market, if the manager earns 7% and the benchmark earns 8%, the upside capture is 87.5%. If, during a down market, the manager earns -6% and the benchmark earns -10%, the downside capture is 60%. Therefore, the capture ratio is about 1.46 ($87.5\% / 60\%$), which indicates a positively asymmetrical (convex) return profile. Ideally, the manager would capture as much of the upside as possible and capture as little of the downside as possible to maximize the capture ratio.

Drawdown

Drawdown is a measure, based on past performance, that calculates the maximum loss incurred if an investor had invested at a peak valuation and subsequently liquidated at a trough valuation. Drawdown duration is the total time required to fully recover a drawdown; it is from when the drawdown commences up to when the cumulative drawdown is zero. Drawdown duration can be subdivided into a drawdown phase and a

recovery phase. Maximum drawdown occurs at the very end of the drawdown phase and at the very start of the recovery phase; it is the point at which the cumulative drawdown is at its highest (in absolute terms).

To illustrate and calculate drawdown duration and maximum drawdown, consider the following data pertaining to the monthly returns of a stock for a 12-month period.

Month	Monthly Return	Drawdown	Cumulative Drawdown	Comments
01/2018	3.14%		0.00%	
02/2018	-2.55%	-2.55%	-2.55%	Drawdown phase begins
03/2018	-2.71%	-2.71%	-5.26%	
04/2018	-4.66%	-4.66%	-9.92%	
05/2018	-4.91%	-4.91%	-14.83%	
06/2018	-0.73%	-0.73%	-15.56%	Maximum drawdown
07/2018	2.18%		-13.38%	Recovery phase begins
08/2018	3.11%		-10.27%	
09/2018	2.45%		-7.82%	
10/2018	3.65%		-4.17%	
11/2018	4.03%		-0.14%	
12/2018	4.14%		0.00%	Drawdown recovered

Based on the data provided, the maximum drawdown was calculated as -15.56% and the drawdown duration was approximately 11 months (from beginning of drawdown in 02/2018 to full recovery of drawdown in 12/2018).

Manager Skill Evaluation

LOS 13.p: Evaluate the skill of an investment manager.

The skill of an investment manager can be evaluated through attribution analysis as well as appraisal analysis. An example of each type of analysis is provided next.

Example of Attribution Analysis

Manager X has a benchmark of the Euronext 100. The following summary information states that Manager X underperformed the benchmark by 67 bps. The question is whether the underperformance is due to lack of skill or bad luck.

Market	Manager X		Euronext 100		Attribution Effects		
	Weight	Annualized Return	Weight	Annualized Return	Allocation	Selection + Interaction	Total
France	60%	10.14%	63%	11.49%	-0.04%	-0.81%	-0.85%
Netherlands	15%	8.78%	19%	7.65%	0.09%	0.17%	0.26%
Belgium	15%	9.12%	11%	8.12%	-0.07%	0.15%	0.08%
Portugal	6%	4.35%	5%	4.99%	-0.05%	-0.04%	-0.09%
Luxembourg	4%	7.14%	2%	7.92%	-0.04%	-0.03%	-0.07%
Total	100%	9.32%	100%	9.99%	-0.12%	-0.56%	-0.67%

The manager underperformed the benchmark by 12 bps due to country weighting decisions. Although the manager made a good decision in underweighting the Netherlands by 4% because it underperformed the total benchmark by 2.34%, the manager made bad decisions in all of the other countries. For example, the manager underweighted France by 3% when it outperformed the total benchmark by 1.50% and overweighted Belgium by 4% when it underperformed the total benchmark by 1.87%. Overall, the manager was not successful with country weighting decisions.

The manager underperformed the benchmark by 56 bps due to stock picking decisions. Although the manager selected outperforming stocks in the Netherlands and Belgium that earned a total of 32 bps, there was significant underperformance in France that lost 81 bps. Overall, the manager was not successful with picking stocks. Additionally, the selection effect was significantly greater than the allocation effect.

In the next example, the level of risk taken to achieve the manager's performance will be considered by comparing performance to other managers.

Example of Appraisal Analysis

In this section, performance appraisal measures for the same period will be analyzed for Managers X, Y, and Z. All managers will be compared to the same benchmark; return and standard deviation percentages are all expressed on an annualized basis.

Appraisal Measure	Manager X	Manager Y	Manager Z	Benchmark
Return	9.32%	11.42%	8.12%	9.99%
Standard deviation	11.65%	13.76%	10.11%	11.98%
Sharpe ratio	0.63	0.68	0.61	0.67
Treynor ratio	0.07	0.08	0.06	0.08
Information ratio	(0.22)	0.41	(0.72)	–
Sortino ratio (MAR = 4%)	0.75	0.78	0.63	0.87

Manager X's volatility of returns (as measured by standard deviation) is only slightly below that of the benchmark. Manager X's volatility of returns is between that of Manager Z (Z is lower by about 1.5%) and Manager Y (Y is higher by about 2.1%). Those observations are confirmed by the Sharpe ratios for all three managers and the benchmark (using an assumed risk-free rate of 2%). Therefore, although Manager X took on less total risk and earned less return than the benchmark and Manager Y, Manager X's return was relatively lower than both of them on an excess return (annualized return less risk-free rate) per unit of risk basis. Manager X did perform better than Manager Z on a risk-adjusted basis.

The conclusions based on the Sharpe ratio are consistent with those for the Treynor ratio and IR. Given that both Manager X and Manager Z underperformed the benchmark, it makes sense that their IRs are negative. Therefore, on the basis of systematic risk only, Manager X did not perform as well as Manager Y or the benchmark.

Manager X's Sortino ratio of 0.75 is higher than its Sharpe ratio of 0.63, which suggests that Manager X should be able to earn greater returns in relation to the 4% threshold for measuring downside risk.

Conclusion

Overall, Manager X was not able to demonstrate sufficient skill in investing as demonstrated by losses incurred due to poor country allocation and poor stock selection decisions, relative to the benchmark.

Additionally, on a risk-adjusted basis, Manager X did outperform Manager Z but fell short when compared to Manager Y and the benchmark.

Consideration may need to be given to replacing Manager X with a suitable manager who is able to outperform the benchmark in terms of country allocation and stock selection as well as outperform its peers on a risk-adjusted basis.



MODULE QUIZ 13.4

1. One of your portfolio managers, Mort Van Sleet, has recently complained that by measuring risk-adjusted returns using the Sharpe ratio, he is placed at an unfair disadvantage. He has stated flatly that the standard deviation of his portfolio returns is artificially inflated. **Explain** how this can be true, and **offer** and **explain** a potential solution to the problem.
2. During an up market, assume a manager earns 4% and the benchmark earns 3%. Then, in a down market, the same manager earns -4% and the benchmark earns -8%. Which of the following amounts is *closest* to the manager's capture ratio?
 - A. 0.25.
 - B. 0.38.
 - C. 2.67.

KEY CONCEPTS

LOS 13.a

Performance evaluation answers three questions regarding a portfolio's performance:

1. What performance did the fund achieve during the period (performance measurement)?
2. How did the fund manager achieve their performance (performance attribution)?
3. Did the fund manager achieve their performance via skill or luck (performance appraisal)?

An effective performance attribution process includes:

- A reflection of 100% of the portfolio's return or risk exposure.
- The portfolio manager's current decision-making process.
- The active investment decisions taken by the portfolio manager.
- A full explanation of the portfolio's excess return and risk.

LOS 13.c

Return attribution evaluates the impact of the active portfolio management decisions on the fund's investment returns. Risk attribution is the parallel of return attribution but analyzes the impact of the portfolio manager's active investment decisions on portfolio risk.

Micro attribution analyzes the portfolio at the portfolio manager's level and seeks to verify that the portfolio manager did what they said they were going to do and to understand the drivers of the portfolio's return. Macro attribution analyzes investment decisions at the fund sponsor's level and quantifies the decisions made by the fund sponsors to deviate from their strategic asset allocation and the timing when they made those decisions.

LOS 13.d

Returns-based attribution uses regressions to analyze the portfolio returns over some period and isolates the asset class components through indexes that would have generated these returns. There is no attempt to determine the actual holdings of the portfolio.

Holdings-based attribution uses beginning-of-period portfolio assets; the accuracy of analysis improves as the time interval for the analysis becomes smaller (e.g., annual to monthly, to weekly). Since holdings-based attribution does not adjust for any portfolio changes that are made after the initial period, this analysis frequently does not match the actual portfolio returns.

Transactions-based attribution improves upon the holdings-based attribution by updating the attribution of the beginning-of-period holdings of the portfolio with any subsequent trades. Both the weights and the returns of the portfolio will reflect the actual transactions, including any transaction costs.

LOS 13.e

The Brinson-Hood-Beebower (BHB) and Brinson-Fachler models quantify the portfolio returns into three attribution effects: the allocation effect, the security selection effect, and the interaction effect.

- The allocation effect refers to the portfolio manager's decision to overweight or underweight specific sector weightings in the portfolio versus the portfolio benchmark.
- The security selection refers to the value the portfolio manager either added or detracted from the portfolio by selecting individual securities within the sector and

weighting the portfolio differently compared to the benchmark's weightings.

- The interaction effect refers to the residual amount that ensures the arithmetic return minus the relative benchmark is fully accounted for in attribution analysis.

The Carhart model calculates the excess return from active portfolio management investment decisions by determining the impact on the portfolio due to the following factors: (1) market index (RMRF), (2) market capitalization (SMB), (3) book value to price (HML), and (4) momentum (WML).

LOS 13.f

Exposure decomposition is a top-down approach that utilizes duration to quantify active portfolio manager decisions regarding interest rate decisions relative to its benchmark.

Yield decomposition (duration) can be either top-down or bottom-up and utilizes both duration and yield to maturity (YTM) in computing price return (as one component in calculating total return).

Yield decomposition (full repricing) involves repricing based on zero-coupon curves, or spot rates. The full-repricing method is the most accurate measure of price changes in securities.

LOS 13.g

There are two general methods of risk attribution: relative and absolute.

For relative attribution analysis, tracking risk (or tracking error) is the relevant risk measure to consider and the general objective is to determine the returns generated from active management and compare them to the amount of tracking risk assumed.

Absolute attribution analysis quantifies general risk arising from market, size, and style exposures and specific risk arising from stock picking. A common risk measure to use is standard deviation.

LOS 13.h

Macro attribution analysis looks at the impact of fund sponsor decisions. Micro attribution analysis looks at the impact of portfolio manager decisions. Both types of analysis utilize the BHB and Brinson-Fachler model computations to determine allocation, selection, and interaction effects.

LOS 13.i

A liability-based benchmark focuses on the cash flows necessary to satisfy the liability and frequently limits the investment choices available to the portfolio manager (e.g., equity and fixed income only). Frequently used assets within a liability-based benchmark include nominal bonds, inflation-adjusted bonds, and high-quality stocks.

LOS 13.j

There are seven types of benchmarks:

1. An absolute benchmark is a return objective that aims to exceed a minimum target return.

2. Broad market indexes, such as the S&P 500 for U.S. common stocks, can be used as benchmarks.
3. Investment-style indexes represent specific portions of an asset category and can be used as a benchmark. Four well-known U.S. common stock style indexes are (1) large-capitalization growth, (2) large-capitalization value, (3) small-capitalization growth, and (4) small-capitalization value.
4. Factor models involve relating a specified set of factor exposures to the returns on an account. Some examples of factors are the market index, industry, growth characteristics, a company's size, and financial strength. The benchmark portfolio (the normal portfolio) is the portfolio with exposures to the systematic risk factors that are typical for the investment manager. The manager's past portfolios are used as a guide.
5. Returns-based benchmarks are constructed using (1) the managed account returns over specified periods and (2) corresponding returns on several style indexes for the same periods. Those return series are submitted to an allocation algorithm that solves for the combination of investment-style indexes that most closely tracks the account's returns.
6. A manager universe looks at a wide group of managers that have a similar investment process. The median manager or fund from that universe is used as the benchmark. The median manager is the fund that falls at the middle when funds are ranked from highest to lowest by performance.
7. Custom security-based benchmarks are designed to reflect the manager's security allocations and investment process.

LOS 13.k

A portfolio return can be broken up into three components: market, style, and active management.

$$P = M + S + A$$

where:

P = investment manager's portfolio return

M = return on the market index

S = B – M = excess return to style; difference between the manager's style index (benchmark) return and the market return—S can be positive or negative

A = P – B = active return; difference between the manager's overall portfolio return and the style benchmark return

LOS 13.l

When an incorrect benchmark is used in the performance evaluation process then performance measurement, which comprises attribution and appraisal analysis, will not be useful. Misspecified benchmarks will result in "misfit" active return.

LOS 13.m

Three general types of benchmarks could be considered for hedge funds: (1) broad market indexes, (2) risk-free rate, and (3) hedge fund peer universes. However, broad market indexes are not appropriate to use as a benchmark for hedge funds because

hedge funds cover a wide range of investment strategies and differ significantly from each other. The risk-free rate is not appropriate because the vast majority of hedge funds will carry some systematic risk and the use of leverage will only exacerbate the risk. Hedge fund peer universes are not suitable because a specific peer group's risk and return objectives is not likely to match that of a specific hedge fund.

With the many real estate benchmarks that could be used, they may not be suitable for all real estate investments for reasons including: small sample size, bias toward larger investments, use of appraisal data, lack of consistency regarding use of leverage, and unrealistic assumptions of no transaction costs, full transparency, and normal liquidity.

Private equity benchmarks usually use internal rate of return (IRR) measures but managers may be using different methods of valuation. Also, IRR may be biased by losses or gains occurring near the beginning of an investment. Finally, all the results are reported at one common point in time even though the firms are likely in varying stages of development.

Benchmarks for commodity investments are usually based on futures as opposed to actual assets. That may result in significant differences between the benchmark and the commodity investments portfolio, which reduces the comparability.

Managed derivatives use specific benchmarks because of the lack of market indexes. As a result, such benchmarks may be too specific or not specific enough for a given investment strategy and therefore not suitable.

Given the illiquidity and severe lack of marketability of distressed securities, it is almost impossible to determine an appropriate benchmark.

LOS 13.n, 13.o

The Sharpe ratio is calculated as the incremental or excess return over the risk-free rate (numerator) divided by standard deviation (denominator). A key drawback with the ratio is that the denominator does not differentiate between volatility that is upside versus downside.

The Treynor ratio is similar to the Sharpe ratio but the denominator for the former is measured by beta so it only considers systematic risk rather than total risk like the latter.

The information ratio (IR) is used to measure a portfolio's performance against the benchmark but accounting for differences in risk. The numerator is the difference between the mean returns of the portfolio and the benchmark, respectively. The denominator is known as the tracking risk, or the variability in the portfolio performance with that of its benchmark.

The appraisal ratio (AR) is calculated as alpha divided by the standard deviation of the residual/unsystematic risk (or otherwise known as the standard error of regression). Alpha is excess return, calculated as the return earned by the portfolio minus the return suggested by CAPM.

The Sortino ratio only considers the standard deviation of the downside risk. It uses a minimum acceptable return (MAR, or target rate of return) and target semi-standard

deviation (target semideviation). The Sortino ratio penalizes managers only for “bad” volatility by considering only returns below the MAR.

Capture ratios determine the manager’s relative performance when markets are up or down. Consider an up market where the index or benchmark return is positive. The question is whether the manager’s portfolio return is also positive and if it is above or below the benchmark return (upside capture). Similarly, consider a down market where the index or benchmark return is negative. The question is whether the manager’s portfolio return is negative and if it is above or below the benchmark return (downside capture). Using those amounts, the capture ratio is calculated as upside capture divided by downside capture.

Drawdown duration is the total time required to fully recover a drawdown; it is from when the drawdown commences up to when the cumulative drawdown is zero. Maximum drawdown occurs at the very end of the drawdown phase and at the very start of the recovery phase.

LOS 13.p

The skill of an investment manager can be evaluated through attribution analysis as well as appraisal analysis.

ANSWER KEY FOR MODULE QUIZZES

Module Quiz 13.1

- 1. A** Performance appraisal determines whether the performance was affected primarily by investment decisions, by the overall market, or by chance. Performance appraisal combines output from both performance measurement and performance attribution to render a professional judgment on the quality of the performance.

Performance measurement serves as the initial foundation phase and calculates both the return and the risk of the fund over specified time periods. Performance attribution determines the key drivers that generated the account’s performance. (LOS 13.a)

- 2. C** Transactions-based attribution improves upon the holdings-based attribution by updating the attribution of the portfolio’s beginning-of-period holdings with any subsequent trades. Transactions-based attribution is the most reliable of the measures.

Returns-based attribution uses regressions to analyze the portfolio returns over some period and isolates the asset class components through indexes that would have generated these returns. There is no attempt to determine the actual holdings of the portfolio. It is the least reliable of the three methods but the easiest to implement.

Holdings-based attribution uses beginning-of-period portfolio assets; the accuracy of analysis improves as the time interval for the analysis becomes

smaller. Holdings-based attribution frequently offers a higher level of quality of attribution analysis than the returns-based attribution. (LOS 13.d)

Module Quiz 13.2

1. (i) energy sector allocation effect = $[(0.0838 - 0.0772) \times (3.32\% - 2.32\%)] = 0.0066\%$

This shows that the decision to overweight a sector that performed better than the overall benchmark resulted in a positive contribution to portfolio performance.

- (ii) financial sector security selection effect = $0.1342 \times (1.66\% - 1.10\%) = +0.0752\%$

The positive contribution shows that the Hiatus portfolio held financial stocks that performed better than the financial stocks contained in the sector benchmark.

- (iii) technology sector interaction effect = $[(0.1789 - 0.2201) \times (3.21\% - 3.18\%)] = -0.0012\%$

Underweighting the portfolio in the technology sector when the fund performed better than the sector benchmark has led to a negative contribution. (LOS 13.h)

2. **C** To answer this question, we must first examine the return for the overall benchmark versus the return for the benchmark in both sectors. The overall return for the benchmark is given at 0.86%. The capital goods sector return in the benchmark was -5.00%. For the financial sector, it was 4.00%. Thus, relative to the overall benchmark return of 0.86%, the capital goods sector was an underperforming sector and the financial sector outperformed. Now determine whether Matson overweighted or underweighted each sector. He underweighted the weak capital goods sector (8.00% allocation for the manager versus 9.00% for the benchmark), and he overweighted the strong financial sector (20.00% allocation for the manager versus 18.00% for the benchmark). Because Matson underweighted a weak sector and he overweighted a strong sector, he made correct decisions for both.

No calculations are needed to reach these conclusions. However, the allocation effect can be calculated by multiplying the difference between the portfolio and benchmark allocation by the difference in sector benchmark return and overall benchmark return for each sector. For the capital goods sector, it is $(8.0\% - 9.0\%) \times (-5.00\% - 0.86\%) = 0.0586\%$. For the financial sector, it is $(20.0\% - 18.0\%) \times (4.00\% - 0.86\%) = 0.0628\%$. (LOS 13.h)

3. **B** To answer this question, examine the return for the manager against the return for the benchmark in each sector. Matson's return in the consumer durables sector was 2% versus 3% for the benchmark, so he did not outperform the benchmark for security selection in this sector. However, the return for the manager in the technology sector was 2.6% versus -2% for the benchmark, so he did outperform the benchmark for security selection in this sector.

No calculations are needed to reach the conclusions just listed. However, the selection effect can be calculated by multiplying the difference between the portfolio and benchmark return in each sector by the benchmark's weight. For the consumer durables sector, it is $(2.0\% - 3.0\%) \times 35\% = -0.35\%$. For the technology sector, it is $(2.6\% + 2.0\%) \times 16\% = 0.736\%$. (LOS 13.h)

4. **B** To answer this question, multiply the difference in weightings for the manager and the benchmark by the difference in returns for the manager and the benchmark in each sector. In the agricultural sector, this is $(4\% - 6\%) \times (-2\% + 1\%) = 0.02\%$. In the utilities sector, this is $(12\% - 10\%) \times (4\% + 2\%) = 0.12\%$. (LOS 13.h)

Module Quiz 13.3

1. style return = $B - M = 9.1\% - 8.5\% = +0.6\%$

active management return = $P - B = 8.9\% - 9.1\% = -0.2\%$

The positive style return tells us small-cap stocks outperformed the market as a whole.

However, the negative active management return tells us Rhombus has underperformed its benchmark for the evaluation period in question.

Consistently underperforming the benchmark would bring Rhombus's investment management skills under question. (LOS 13.k)

2. The median manager is not a valid benchmark because that manager cannot be specified in advance and is not investable. It is not a passive alternative to active management. The only benchmark characteristic it meets is it can be measured after the fact. (LOS 13.j)

Module Quiz 13.4

1. In calculating the traditional standard deviation, all returns for the measurement period are used (e.g., all the positive and negative alphas). This is like looking at the entire normal distribution, with the benchmark return as the center of the distribution. Negative alphas would fall to the left of the benchmark return, and positive alphas would fall to the right.

The manager is arguing that only negative alphas are relevant for measuring risk. This would be analogous to using only the left half of that normal distribution. Using the Sortino ratio compensates for this by only using returns below a designated level.

Excess return for the Sortino ratio (the numerator) is calculated as the portfolio return less the minimum acceptable portfolio return (MAR). The denominator of the ratio is the standard deviation of returns calculated using only returns below the MAR. The motivation behind the downside measure of volatility utilized in the Sortino ratio is the sense that very good performance (high returns) can unfairly inflate the volatility measure (the standard deviation used as the risk measure). (LOS 13.o)

2. **C** If, during an up market, the manager earns 4% and the benchmark earns 3%, the upside capture is 133.3%. If, during a down market, the manager earns -4% and

the benchmark earns -8% , the downside capture is 50% . Therefore, the capture ratio is about 2.67 ($133.3\% / 50\%$). (LOS 13.n)

READING 14

INVESTMENT MANAGER SELECTION

EXAM FOCUS

The investment manager selection process involves both quantitative and qualitative considerations, although the focus in the reading is primarily qualitative. Some topics in the reading (e.g., returns-based and holdings-based style analysis and pooled investment vehicles) are covered in other areas of the curriculum or were covered in previous levels (e.g., Type I and II errors), which should allow for more efficient coverage of the material. Key areas of focus for the exam include Type I and II errors, capture ratios and drawdowns, and computing performance-based fees.

MODULE 14.1: MANAGER SELECTION PROCESS



Video covering this content is available online.

LOS 14.a: Describe the components of a manager selection process, including due diligence.

Due diligence is the analysis and investigation in support of an investment decision, action, or recommendation. Due diligence on investment managers must emphasize the sources and reasons behind the actual returns generated in the past. Then there must be an evaluation on the probability of repeatedly earning sufficient or better returns in the future using the same investment process. Overall, due diligence must consist of manager universe, quantitative analysis, and qualitative analysis.

Manager Universe

The manager universe consists of only those managers who are *suitable* for the portfolio in terms of the objectives and constraints of the IPS, invest in the relevant *style* (e.g., value, growth, mixed) desired by the client, and will manage the portfolio with the appropriate balance between *active versus passive* approaches.

This is a process of elimination that must carefully balance having too many or too few managers in the candidate pool from which to make a selection. The purpose of the manager search is crucial. For example, the desire for a specific new strategy or risk exposure will involve trying to find the best manager for that strategy or exposure. Or the inclusion of a new manager to diversify an existing portfolio would require a

manager who could complement the existing holdings. The terms “best” and “complement,” for example, have an aspect of subjectivity that must be looked at in the context of the IPS.

The search usually begins by establishing the role for the potential manager within the portfolio and that is defined by the benchmark. The benchmark can be determined using one or more of: third-party categorization, returns-based style analysis, holdings-based style analysis, and manager experience. With third-party categorization of managers provided by database or software providers, the problem is that the provider’s definition may not be the same as that definition for the purposes of the role within the portfolio. Manager experience can be ascertained by analyses of holdings within the manager’s portfolios as well as past returns. Returns-based and holdings-based style analyses will be examined in greater detail later.

At the manager universe stage, there should not be any performance assessment; that will occur later during quantitative analysis. Instead, there must be an emphasis on the manager’s risk profile and whether or not it is a good fit for the portfolio’s requirements. The universe of managers is constantly changing as strategies change and as managers come and go.

Quantitative Analysis

The manager’s performance should be evaluated objectively in terms of the distribution of past returns. Through performance **attribution and appraisal**, one can distinguish between managerial skills versus luck (e.g., external market factors). The **capture ratio** would examine performance in both good and weak market conditions. Finally, one must check for any significant *drawdowns* (i.e., peak-to-trough decline in percentage terms for a specific time period).

Qualitative Analysis

Two important issues arise in qualitative analysis: (1) What is the likelihood that the same level of returns will continue in the future? (2) Does the manager’s investment process account for all the relevant risks? Those two issues will be elaborated somewhat here.

Continuity of returns can be assessed by looking at the four Ps—philosophy, process, people, and portfolio. In short, the *philosophy* focuses on a specific area of market inefficiency to earn excess returns. Then the *process* and *people* will determine whether the strategy is feasible and if it is possible to execute the strategy with the given knowledge and skills of the employees. Finally, the *portfolio* must be built in a way that is congruent with the philosophy and process.

Risk assessment considers the *firm* and whether it is robust and performing well, and its likelihood of remaining a going concern. Examining the *process and procedures* of the firm involves aspects such as the quality of the back office, the ability to safeguard assets, and the ability to prepare useful reports on a timely basis. Going into such detail with operational due diligence is meant to determine any risks not evident in the firm’s past returns and to determine the firm’s sustainability. The proposed *investment vehicle*

must be assessed for suitability within the portfolio and the *terms* of the manager contract must be reasonable and relevant in context of the investment strategy and vehicle. Finally, continual *monitoring* of the manager is needed to ensure the manager continues to be the appropriate one for the portfolio.

LOS 14.b: Contrast Type I and Type II errors in manager hiring and continuation decisions.

Type I and II Errors

In making decisions on whether to hire a new manager or to keep or fire an existing manager, hypothesis testing can be used. The null hypothesis (H_0) is that there is no value added, therefore, to demonstrate that it is value added on a statistically significant basis, the calculated test statistic would have to be large enough so that the null hypothesis would be rejected.

As a result, there could be a Type I error whereby the null hypothesis is rejected, when in fact, there was no value added. In other words, the hired or kept manager did not demonstrate sufficient skill. Alternatively, there could be a Type II error whereby the null hypothesis is not rejected, when in fact, there was value added. In other words, the manager who was not hired or the manager who was fired did demonstrate sufficient skill. Figure 14.1 summarizes Type I and II errors.

Figure 14.1: Type I and Type II Errors

		Realization	
		Below expectations (no skill)	At or above expectations (skill)
Decision	Hire/Retain	Type I	Correct
	Not Hire/Fire	Correct	Type II

Type I errors receive much more attention than Type II errors. One reason may relate to the notion of regret aversion by the decision maker, which is linked to an error of commission (a Type I error). Errors of commission are active decisions that result in explicit (or visible) costs. In contrast, Type II errors are errors of omission, so they result in implicit or opportunity (less visible) costs. Another reason is that Type I errors are easier to determine; for example, a manager's relative performance can be measured against a benchmark. Such performance also impacts the decision maker's compensation so additional care would be taken to reduce the risk of a Type I error. In contrast, Type II errors are difficult to determine; for example, how can one objectively determine how a manager (who was not hired) would have performed? Finally, Type I errors are much more visible to clients who can easily determine that their investments have underperformed the benchmark over a specific time period, for example. In contrast, clients are less likely to follow or monitor managers who are not hired or who are fired to determine if such managers would have added value over the same time period.

Preventing Type II Errors

An excessive number of Type II errors would be indicative of a problem with the hiring and firing of managers. The obvious solution to minimizing Type II errors would be to track the subsequent performance of managers who were not hired as well as those who were fired. For example, what are the characteristics of the managers who are selected versus those who are not selected and are those characteristics of the selected managers consistent with the portfolio investment objectives? As well, what are the characteristics of the managers who are retained versus fired, and again, are the characteristics of the retained managers consistent with the portfolio investment objectives? Ultimately, it is important not to hire or fire managers because of short-term performance or because of behavioral biases.

Costs of Type I and II Errors

Type I errors result in costs associated with retaining managers who are weak, while Type II errors result in costs associated with not retaining managers who are strong. Therefore, assuming two separate groups of managers (e.g., strong and weak), the greater the differences in sample size and mean, the greater the costs of Type I and II errors. The wider the dispersion of returns between strong and weak managers, the easier it is to distinguish between their relative skills. Therefore, it makes it less likely to have a Type I or II error which results in a lower expected cost of a Type I or II error.

In an efficient market, the dispersion of return distributions between the two groups is probably smaller due to greater difficulty in achieving alpha through active management, which would lessen the costs of hiring or retaining weak managers (Type I error).

If markets are mean-reverting, then Type I errors may occur when firing a poor performer, only to have performance improve subsequently or hiring a strong performer only to have performance deteriorate subsequently (Note: That is not a Type II error because the assumption is that the poor and strong performers have been accurately determined initially but it is the mean-reversion of the markets that leads to the Type I error). Type II errors occur in mean-reverting markets when strong managers are fired or not hired (e.g., they subsequently underperform when the market goes down) or managers who have weaker short-term performance (but have sufficiently strong long-term performance) are fired or not hired and they subsequently outperform when the market goes up.



MODULE QUIZ 14.1

1. Quantitative analysis of the manager selection process includes:
 - A. defining the universe.
 - B. evaluating a performance appraisal.
 - C. performing investment due diligence.
2. The expected cost of Type I and Type II errors is:
 - A. higher the lower the difference between the mean return of skilled and unskilled managers.

- B. lower the greater the difference between the mean return of skilled and unskilled managers.
 - C. higher the greater the difference between the mean return of skilled and unskilled managers.
3. A return distribution of skilled managers that is not distinct from the return distribution of unskilled managers, *most likely* implies a:
- A. highly inefficient market.
 - B. low opportunity cost of not hiring a skilled manager.
 - C. high opportunity cost of not hiring a skilled manager.

MODULE 14.2: APPROACHES TO MANAGER ANALYSIS



Video covering this content is available online.

LOS 14.c: Describe uses of returns-based and holdings-based style analysis in investment manager selection.

Style Analysis

Style analysis examines the manager's risk exposures (e.g., industry, concentration, capitalization) in relation to an appropriate benchmark and the changes in those exposures over time. The risk exposures allow for the classification of managers (e.g., value, growth) by style for selection purposes and to perform returns-based style analysis (RBSA) and holdings-based style analysis (HBSA). Once RBSA and HBSA have been performed, congruence between the output and the investment process is crucial to ensure the process can be replicated consistently in the future. Monitoring the RBSA and HBSA output over time can help to detect style drift, whereby the manager's actions are deviating from the manager's stated style.

Style analysis is relevant when comparisons can be made over time and between different managers, when it is done on a timely basis, when the risks analyzed are the key sources of the manager's risk and return, and when the reported amounts are consistent with the manager's actual risk exposures. Style analysis works best for publicly traded investments with frequent pricing data. For less liquid investments, style analysis can still be used to generate questions in the due diligence process. In sum useful style analysis must be *meaningful, accurate, consistent, and timely*.

RBSA

RBSA estimates the portfolio's sensitivities to security market indexes for a set of key risk factors. One complication of RBSA is that the risk factors are estimated rather than using predetermined style categories. However, the approach is top-down in nature and little additional data is needed to perform the analysis so the computational approach is relatively easy. RBSA can determine the key risk factors and return drivers for basic and complex strategies. Also, RBSA uses objective data and allows for comparability between managers and through time. Finally, RBSA can be performed on a timely basis (e.g., right after the data is released).

RBSA lacks precision since it essentially assumes that there is a static portfolio for the period. As a result, it makes it difficult to ascertain the impact of multiperiod investment decisions for a given period, and could alter the breakdown of the sources of value added. The portfolio may also contain illiquid securities, so stale prices could understate risk exposure. When performance is computed based on appraisals of ongoing projects and the internal rate of return of cash distributions (e.g., venture capital and private equity), the short-term volatility may be understated. A manager's true return standard deviation is best gauged over a longer time period. Finally, reporting timeliness will decrease in the presence of illiquid or nontraded securities due to the longer time required for pricing.

HBSA

HBSA looks at the actual securities included in the portfolio at one time. That allows one to estimate the current risk exposures using a more security-specific (bottom-up) approach. Many of the advantages are the same as for RBSA (e.g., determine key risk factors and return drivers, comparability between managers and through time, performed on a timely basis). Overall, HBSA is most appropriate for equity-based strategies.

A key drawback of HBSA is the increased computational requirement as complexity increases and transparency decreases. HBSA uses a point in time analysis format that may not be useful in projecting into the future or if the portfolio has high turnover. Similar to RBSA, the presence of illiquid and nontraded securities results in stale pricing and that could understate risk exposure as well as decrease reporting timeliness.

LOS 14.d: Describe uses of the upside capture ratio, downside capture ratio, maximum drawdown, drawdown duration, and up/down capture in evaluating managers.

Capture Ratios

Capture ratios determine how suitable a manager is with respect to the investor's risk tolerance and time horizon. The **upside capture ratio (UC)** looks at capture when the benchmark has a positive return. Based on the benchmark return, UC that is higher (lower) than 100% is indicative of outperformance (underperformance). Conversely, the **downside capture ratio (DC)** looks at capture when the benchmark has a negative return. Based on the benchmark return, DC that is lower (higher) than 100% is indicative of out- (under-) performance.

The **capture ratio (CR)** = UC ratio / DC ratio. The CR is a measure of return asymmetry, > 1 = positive asymmetry (convex shape), and < 1 = negative asymmetry (concave shape).

In examining positive asymmetry (convex shape), the question is whether the investment strategy is naturally convex or if the convexity occurs because of manager skill. With the former, consider an example of a hedging strategy that involves buying a

series of out-of-the-money puts prior to severe market downturns. The result is positive asymmetry with many small losses (low DC ratio) due to the puts expiring worthless with far fewer large gains in this scenario (high UC ratio). With the latter, consider an example of a long-only equity strategy requiring active management to minimize losses and maximize gains. That requires manager skill, but may not result in consistent positive asymmetry.

When betas are increasing (decreasing), momentum-driven strategies should have higher (lower) UC than value-driven strategies. A low-beta (high-beta) strategy will have lower (higher) UC and DC. Therefore, CRs can be used to confirm the investment strategy.

Drawdown

Drawdown is the total peak-to-trough loss for a specified time period; maximum drawdown is the largest peak-to-trough loss during that time period. Large drawdowns are not appropriate for investors approaching the end of their investment horizon.

Drawdown duration is the total time from when the drawdown begins to when the total drawdown recovers to zero (the latter achieved with offsetting gains).

In comparing a long-only strategy (100% invested in S&P TR Index) versus a low-beta strategy (50% in S&P TR Index, 50% in 90-day T-bills), it is quite possible for the low-beta strategy to outperform the long-only strategy on a risk-adjusted returns basis. In other words, a low-beta strategy may have lower absolute returns but the lower risk in the form of lower drawdowns may result in better risk-adjusted returns.

Drawdowns are useful for identifying poor or poorly executed investment strategies, weak internal controls, and operational problems. Significant or extended drawdowns could cause a manager to utilize self-preservationist tactics that could harm the investors.

There is a fine line between risk management versus self-preservation. For example, it may be prudent to immediately sell assets with unrealized losses in a market downturn, because those losses may become worse later due to a fundamental change in the asset. It might be risky to sell assets in a market downturn should there be a subsequent reversal. The question is whether the manager acted properly in accordance with the IPS, acted for self-preservation reasons, or had a sudden overreaction.

In applying the concept of drawdown to the IPS, those investors with shorter time horizons and lower risk tolerance with less time to recover from losses should invest with managers with smaller and less extended drawdowns.



MODULE QUIZ 14.2

- Which of the following statements is *least likely* an advantage of HBSA over RBSA?
 - HBSA is a more precise tool.
 - HBSA is generally easier for equity strategies.
 - The data required for HBSA is generally easier to obtain.
- A manager whose relative performance is better during market upturns *most likely* has a capture ratio that is:

- A. equal to one.
- B. less than one.
- C. greater than one.

MODULE 14.3: EVALUATING MANAGERS



Video covering
this content is
available online.

LOS 14.e: Evaluate a manager's investment philosophy and investment decision-making process.

LOS 14.f: Discuss how behavioral factors affect investment team decision making, and recommend techniques for mitigating their effects.

Investment Philosophy

The entire investment process should be driven by a succinct and precise investment philosophy. Some managers believe that markets are very efficient and that active management will underperform after considering all related costs. Therefore, those managers will execute passive strategies and attempt to earn risk premiums instead. These **risk premiums** are the returns that are earned above the risk-free rate for bearing undiversifiable risks, also referred to as systematic or market risk. To earn risk premiums, passive strategies will target one or more specific systematic risk factors including equity risk, credit risk, liquidity risk, and volatility risk.

In contrast, active strategies take the position that markets are inefficient and can allow for those inefficiencies to be exploited when market prices of securities deviate from their intrinsic values.

There are two broad types of inefficiencies to be considered: behavioral and structural. **Behavioral inefficiencies** are mispricings caused by other investors and their behavioral biases (e.g., trend-following). The mispricings are very short-term in nature and therefore, must be quickly exploited (sometimes within seconds) prior to the market correction. **Structural inefficiencies** occur because of laws and regulations, which can make them long-term in nature. Active strategies often believe in the value of diversification for risk management purposes and believe in the notion of market prices converging to intrinsic value. With the latter, the idea is to exploit the incongruence prior to convergence.

Whatever the investment philosophy, it is necessary for the manager to be able to convey the underlying assumptions in a clear manner. Going deeper, do the assumptions make sense and are they congruent with the investment process? For example, the belief of inefficient markets would not be congruent with a passive approach. Furthermore, has the philosophy remained constant over time, thereby making it repeatable? If not, have the changes in philosophy been logical in view of market changes or have they merely been reactionary based on short-term performance? The former would support the repeatability of the process while the latter would not. Finally, is the inefficiency being exploited more of an informational advantage or more of a *structural inefficiency*? The former is more short-term in nature and likely less repeatable, while the latter is more long-term in nature and likely more repeatable.

Assuming there is a valid inefficiency to exploit, there is the related issue of capacity. Capacity refers to the amount, repeatability, and sustainability of the inefficiency. For example, the inefficiency must provide enough excess returns to cover transaction costs and fees. If leverage is required, then borrowing costs must be considered. Also, is the inefficiency repeatable or just a one-time opportunity? Finally, what minimum asset level is required in order to earn a sufficient return from the inefficiency? Therefore, sustainability depends on market depth and liquidity and the amount of capital that can be set aside to exploit the inefficiency.

Behavioral Biases among Investment Teams

Many investment decisions are made by teams rather than by individuals. Individuals in the group will bring their unique talents and experiences to the decision-making process. Instead of relying on one individual, using a group to make investment decisions will help mitigate key person risk.

Investment teams' performance may be adversely affected by three common behavioral biases.

- **Groupthink** results from teams attempting to minimize conflict and dissent in reaching and maintaining a consensus. This may result in individuals withholding information and/or being reluctant to share their insights. One symptom of groupthink is confirmation bias, where new information, different interpretations, and dissent are minimized or discarded.
- **Authority bias** involves deferring decisions to group members that are perceived to be subject matter experts or in positions of authority. This may result in a lack of perspectives and skills from other group members.
- **Aversion to complexity**, also known as Parkinson's law of triviality, occurs when too much attention is given to small issues rather than the more important and difficult topics, such as asset allocation and manager selection. For example, a team may invest too much time researching a familiar small position in the portfolio rather than spending that time more wisely analyzing a large position that is not as well known by the group.

Due diligence may determine whether or not a manager has built team structures and processes to deal with behavioral biases. An inquiry may include the following:

- *How large is the investment decision-making team?* A team size between three and five is optimal with larger teams being subject to coordination issues and increasing the odds of groupthink.
- *How are decisions made within the team?* For example, a secret ballot may be preferable over an open deliberation. This may result in reducing groupthink and authority bias.
- *How are team meetings conducted? What is on the agenda?* Agendas should be agreed upon in advance in order to mitigate complexity aversion and availability bias. The most important topics should be discussed first and have the most time allocated to these concerns.

- *How diverse is the investment team?* Team diversity, in terms of social and cognitive categories, has been shown to reduce groupthink and errors.

Investment Decision-Making Process

Idea Generation

An investment signal may be a piece of information that can be used to establishing an investment position to exploit an inefficiency. To effectively exploit inefficiencies, investment strategies must utilize unique information to have an informational advantage over other market participants. Additionally, that information must be obtained and used on a very timely basis as it is frequently the case that the window of opportunity to exploit is very short. Finally, the investment manager must have superior cognitive or interpretive skills with regards to utilizing the information.

Idea Implementation

Here the investment idea is transformed into an investment position (i.e., signal capture). Two key concerns include the repeatability of process and its congruence with the investment philosophy plus the determination and approval of the investment position.

Portfolio Construction

A fundamental question is what kinds of securities are used to construct the portfolio. For example, if derivatives are used, then is the manager sufficiently knowledgeable and experienced with derivatives to adapt to changing markets?

The portfolio allocations may be done quantitatively or qualitatively. Either way, the allocations must make sense in view of the investment philosophy. For example, a passively managed portfolio should not have excessive turnover. The allocations should also account for the manager's views, therefore, performance maximization would occur by overweighting the expected outperformers and underweighting the expected underperformers. A related issue is the allocation of long and short positions—they may be paired or determined separately. If they are paired, then proper position sizing will eliminate market risk. At the same time, it will allow for the exploitation of inefficiencies prior to the convergence of market prices with intrinsic values.

Assets under management (AUM) will likely increase over time, therefore, the underlying positions may need to be adjusted (e.g., liquidity constraints) to allow for greater AUM.

Stop losses are orders to sell a security once it reaches a certain price and can be an important risk management tool. Hard or soft stop losses may be used. The former involve automatic dispositions when a specific loss threshold is met and the latter involve subjective evaluations when a specified loss threshold is met. As well, hedges are used to manage risk so information about how they are implemented, the financial instruments used to hedge, and the determination of hedge ratios, is necessary.

With liquidity, it should be determined whether the manager is a net supplier or demander of liquidity. Either way, care must be taken to ensure that the portfolio can

react appropriately to changing market conditions or investor liquidity requirements. A portfolio that has too many illiquid securities may be faced with high exit costs in addition to the usual high transaction costs. There is also the risk of having to sell securities at depressed prices if funds are suddenly required by the investor. Therefore, in assessing liquidity, there should be an analysis of how much of the portfolio can be liquidated in five days or less (more liquid and therefore, greater flexibility) and well as how much needs more than 10 days to liquidate (less liquid and therefore, subject to higher transaction costs). A calculation of average daily volume (weighted by portfolio position size) is also necessary. Finally, there should be the determination of any security where the firm owns more than 5% of its total market capitalization as that would suggest some liquidity problems if the entire position needed to be disposed of suddenly.

Portfolio Monitoring

The monitoring process looks at external factors such as the general economy and financial markets and their impact on how the manager may exploit relevant inefficiencies. It also looks at internal factors such as historical returns, risk level, and allocations. There is a check for any significant deviations from the investment process (e.g., style drift) and to ensure that investment decisions are congruent with the most up-to-date client objectives.

LOS 14.g: Evaluate the costs and benefits of pooled investment vehicles and separate accounts.

Separately managed accounts (SMAs) and pooled investment vehicles are used to execute investment strategies. Pooled vehicles bring together the funds from all investors into one portfolio (e.g., mutual funds, ETFs, hedge funds) and there is no customization for any specific investor. SMAs hold the funds of one investor in a separate account so a key analysis is the cost-benefit trade-off of holding investments in a SMA. As well, one must ensure the manager has the capability and resources to manage the SMA.

Compared to pooled investments, SMAs have higher transaction costs but provide control, customization, tax efficiency, separate reporting, and greater transparency. The *control* is in the form of direct and legal ownership of the underlying securities by the investor. Therefore, there is extra protection given to the investor in case of a liquidity event or bankruptcy of the manager. As well, unlike pooled investments, the investor is not impacted by the redemption demands of other investors. In terms of *customization*, SMAs allow for the tailoring of client-specific objectives and constraints. *Tax efficiency* could be higher in SMAs because there is only payment of realized capital gains required; for pooled investments, payment of accrued taxes on unrealized gains may be required. Investing strategies for SMAs can be tailored to minimize taxes paid by the individual investor. In terms of transparency, SMAs can provide an instantaneous snapshot or dashboard view of the investment holdings at any given point. Pooled investments may be able to do so but probably with a delay.

Customized SMAs require an extra layer of due diligence to evaluate security selection, portfolio construction, and operational issues. Cost-wise, SMAs have fixed costs that must be borne entirely by the one investor and cannot be spread amongst multiple investors in the case of pooled investments. For pooled investments, the incremental costs of adding additional investors are relatively low (e.g., custody, reporting) whereas SMAs require a separate account for each investor. Trading costs are relatively higher for SMAs because trades cannot be aggregated (e.g., buy and sell trades amongst multiple investors) to reduce trading volumes. A customized SMA will differ from the benchmark so it creates tracking risk due to investor constraints instead of manager actions. Customized SMAs are subject to micromanagement risk on the part of the investor and that makes it difficult to determine the true value added by the manager (if any). Investors may be subject to trend chasing, avoidance of unfamiliar investments, and not understanding the benefits of hedging (which often involve sacrificing some returns).



MODULE QUIZ 14.3

1. Passive strategies earn risk premiums based on bearing:
 - A. systematic risk only.
 - B. unsystematic risk only.
 - C. both systematic and unsystematic risk.
2. Which step in the investment decision-making process focuses on the attributes of information in exploiting inefficiencies?
 - A. Signal capture.
 - B. Signal creation.
 - C. Portfolio construction.
3. One reason for an investor to choose a separately managed account over a pooled investment vehicle would *most likely* include the investor:
 - A. is tax exempt.
 - B. desires lower costs and fees.
 - C. desires real-time details on investment positions.
4. A research analyst is considering recommending an airline stock to a group of three portfolio managers. One of the managers is a former transportation research analyst and votes against adding the stock to the portfolio. The other two members of the group agree and vote to not buy the stock. This is an example of:
 - A. groupthink.
 - B. authority bias.
 - C. confirmation bias.

MODULE 14.4: MANAGER CONTRACTS AND FEES



Video covering this content is available online.

LOS 14.h: Compare types of investment manager contracts, including their major provisions and advantages and disadvantages.

Although investment contracts cover a wide variety of terms, the focus here will be on liquidity and management fees, in context of what is most suitable for the investor's needs.

Liquidity

Closed-end funds and ETFs have the highest liquidity because they are traded intra-day. Open-end funds offer almost as much liquidity in that they are traded based on end-of-day NAV only.

Investments held in limited partnership structures (e.g., hedge funds, private equity, and venture capital) usually involve investment capital that is tied up for more time. For example, hedge fund liquidity involves redemption frequency, lockup periods, notification periods, and gates. Redemption frequency refers to how often the investor may withdraw funds, and the notification period refers to the amount of advance notice required by the investor for a redemption. The lockup period refers to the period immediately following the initial investment, where funds may not be withdrawn. A hard lock does not permit redemptions, while a soft lock permits redemptions for a fee. Gates provide for a limit in the redemption amount for any given redemption.

Private equity and venture capital funds have the lowest liquidity because of capital calls; investors only receive returns after about five years into the 10-year average life of the funds. The manager may extend the life of the fund for up to two one-year periods, which further lowers liquidity.

Key advantages of limited partnership terms include ability to have a long investment horizon, thereby not allowing investors to overreact to short-term aberrations. As well, allowing for the earning of illiquidity premiums by investing in illiquid assets and not being forced to sell assets at depressed prices due to redemption requests.

Key disadvantages of limited partnership terms include the impaired ability to change portfolio allocations in response to changes in the market. As well, the impaired ability to meet sudden liquidity demands.

With SMAs, the liquidity is determined by the liquidity of the underlying assets, as the securities can be sold at any time.

LOS 14.i: Describe the three basic forms of performance-based fees.

Management Fees

Managers charge fees to cover their fixed and variable costs as well as to earn a profit. The average asset-weighted expense ratio paid by mutual investors has declined substantially over the years as investors have increasingly allocated to no-load mutual funds and index funds which have lower fees.

Mutual fund fees are often based on AUM. In some cases, minimum balances are required. Fees can be structured as a fixed dollar amount or on the basis of a percentage of assets. The fee structure (e.g., AUM, performance-based) is important to ensure that managers work to the advantage of the investors. It could be argued, however, that even in the absence of incentives, managers will still work to the advantage of the investors to retain them and potentially gain new investors. However, the fee structure may result in a misalignment of the principal and the agent's interests. For example, the

investor does not always see the full extent of all the work the manager is doing; or the investor and manager may have different opinions on how to interpret time horizons or investment losses. Additionally, overall investment performance has a strong element of luck, so in theory, the manager should not be rewarded for it.

An advantage of the investor paying fees based on AUM is that it rewards based on the manager's skill and ability to grow the asset base. Many managers have declining percentage fees for larger accounts, so the AUM fee percentage is reduced with increased asset size, which reduces investors' fees. Unfortunately, luck may play a significant role in the short-term growth of assets. Another disadvantage is that once the assets are attained by the managers, there is more incentive to retain the assets and earn the AUM fees (e.g., engage in safe strategies, such as indexing) rather than take risks for the benefit of the investor.

Basic Forms

Performance-based fees are a form of risk sharing between the investor and the manager in order to align their interests. They are computed on the basis of total or relative return. The fees (using a sharing percentage) could be based on total performance or performance in excess of a base.

There are three basic forms of performance-based fees:

- Symmetrical structure with full upside and downside exposures.
 - Fee = base + performance sharing
 - The greatest alignment between investor and manager incentives but increased risk to manager due to the full downside exposure
- Bonus with full upside and limited downside exposures.
 - Fee = Greater of: (1) base, (2) base + sharing of positive performance
- Bonus with limited upside and downside exposures.
 - Fee = Greater of: (1) base, (2) base + sharing of positive performance (within limit)

Performance-based fee structures transform symmetrical gross active return distributions into asymmetrical net active return distributions. The result is lower relative variance on the upside versus the downside. Therefore, by using a symmetrical risk measure such as standard deviation, there could be an underestimation of downside risk.

Performance-based fees benefit investors since they will pay relatively lower performance-based fees (rather than relatively higher standard fixed fees) in the case of low active returns. Such fees benefit managers, as they may incentivize them to increase their efforts to benefit the investor's portfolio and to increase their own compensation. However, all three structures have in common the fact that base fees are paid even when the manager underperforms.

Some investments have no limits on performance fees. In some cases, performance fees could be tempered to include high-water or clawback provisions (e.g., hedge funds) that

will offset prior period negative returns from current period positive returns, for example. For private equity partnerships, the investors are structured as limited partners and the manager as the general partner. A beneficial term for the investors is one that stipulates the repayment of principal and share of profits to the limited partners prior to any payment of performance fees to the general partner.

In negotiating fee agreements, only the most successful managers or the ones with limited capacity can command the highest base fees and/or the highest sharing percentages.

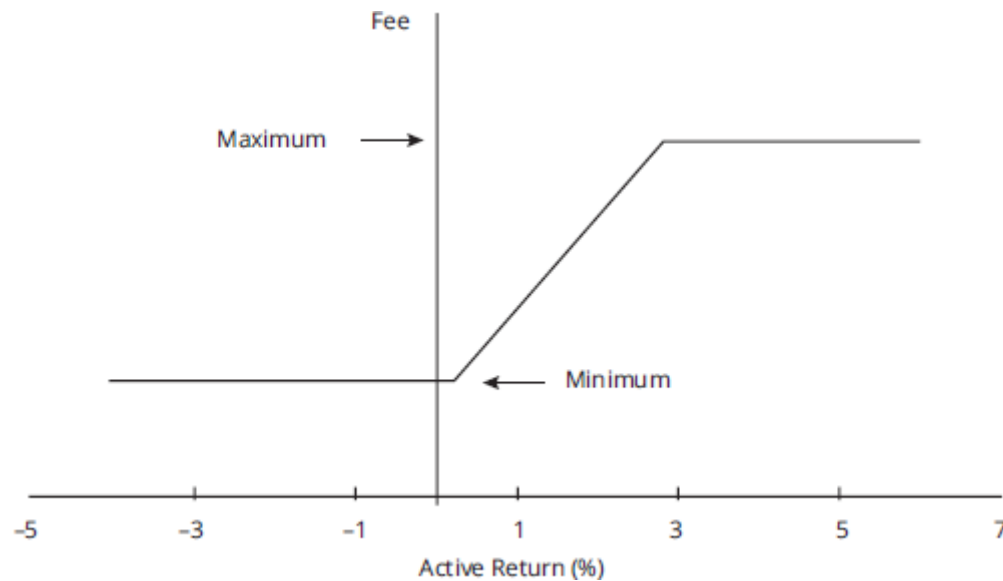
Call Option

The previous bonus fee structures are analogous to a manager having a long position in a call option on the portfolio active return. The exercise price would be the base fee. See Figure 14.2 for a graphical representation. The payoff to the manager is theoretically unlimited.

Figure 14.2: Payoff Line of Sample Performance-Based Fee Schedule 1



In Figure 14.3, there is the addition of a short position in a less valuable call option with an exercise price equal to the maximum fee (assuming such a provision is applicable).

Figure 14.3: Payoff Line of Sample Performance-Based Fee Schedule 2

Based on this discussion, a net long position in a call option on portfolio active return, would cause a manager to take more risk since option pricing theory states that higher volatility increases option value. Therefore, it is recommended that managers be both penalized for taking too much risk and rewarded for earning higher risk-adjusted returns.

Other Issues

LOS 14.j: Analyze and interpret a sample performance-based fee schedule.

A sample performance-based fee schedule is illustrated in Figure 14.4.

Figure 14.4: Sample Performance-Based Fee Schedule**Panel A. Sample Fee Structure**

Standard fee	0.50%
Base fee	0.25%
Sharing*	20%
Breakeven active return	1.50%
Maximum annual fee	0.75%

Panel B. Numerical Examples for Annual Periods

	Active Return		
	$\leq 0.25\%$	1.50%	$\geq 2.75\%$
Billed fee	0.25%	0.50%	0.75%
Net active return	$\leq 0.00\%$	1.00%	$\geq 2.00\%$

* On active return, beyond base fee.

Based on the details in Panel A and the summary calculations in Panel B of Figure 14.4, the fee is a bonus with limited upside (maximum billed fee) and downside (minimum billed fee) exposures. There is symmetry within the active return range of 0.25% and 2.75% and centered around a breakeven active return of 1.50%. In calculating the breakeven return, we have the following:

$$(1.50\% - 0.25\%) \times 20\% = 0.25\% \text{ performance fee}$$

Adding the performance fee to the base fee of 0.25% results in a total billed fee of 0.50%, which is the same as the standard fee of 0.50%.

At an active return of 0.25% or less, the performance fee is zero (the nonnegativity constraint frequently encountered in practice prevents the performance fee from being negative).

In that case, the billed fee is simply the base fee of 0.25%. At an active return of 2.75% or more, the performance fee is maximized at 0.50%, and so the billed fee is a maximum of 0.75%.

**MODULE QUIZ 14.4**

- Which investment fund generally has the *least* amount of liquidity?
 - Hedge fund.
 - Closed-end fund.
 - Private equity fund.
- Which of the following fee structures *most likely* has no impact on the volatility of a portfolio's net returns?

- A. Incentive fees only.
B. Management fees only.
C. Neither incentive fees nor management fees.
3. Fund X earns a -3% gross return for the year. The computed management fee is equal to a base fee of 2% plus a 20% sharing of both positive and negative performance. The sharing is based on return net of the base fee. What is Fund X's total management fee for the year?
- A. 1.0% .
B. 1.4% .
C. 2.0% .
4. Fund Y earns a gross return of 12% for the year, while the relevant benchmark earns 3% . The computed management fee is equal to the higher of either a base fee of 0.4% , or base plus a 20% sharing of positive performance, up to a maximum annual fee of 2.9% . The sharing is based on active return. What is Fund Y's total management fee for the year?
- A. 2.2% .
B. 2.8% .
C. 2.9% .

KEY CONCEPTS

LOS 14.a

In the context of investment manager selection, due diligence consists of manager universe, quantitative analysis, and qualitative analysis.

The manager universe consists of only those managers who are *suitable* for the portfolio in terms of the objectives and constraints of the IPS, invest in the relevant *style* (e.g., value, growth, mixed) desired by the client, and will manage the portfolio with the appropriate balance between *active versus passive* approaches.

Quantitative analysis focuses on performance attribution and appraisal as well as the analyses of CR and significant drawdowns.

Two important issues arise in qualitative analysis:

- What is the likelihood that the same level of returns will continue in the future?
- Does the manager's investment process account for all the relevant risks?

LOS 14.b

Type I errors occur when the null hypothesis is rejected, when in fact, there was no value added. In other words, the hired or kept manager did not demonstrate sufficient skill. Type II errors occur when the null hypothesis is not rejected, when in fact, there was value added. In other words, the manager who was not hired or the manager who was fired did demonstrate sufficient skill.

Type I errors receive much more attention than Type II errors since the former are errors of commission (more visible) while the latter are errors of omission (less visible). Also, Type I errors are easier to determine than Type II errors.

Style analysis examines the manager's risk exposures in relation to an appropriate benchmark and the changes in those exposures over time. The risk exposures allow for the classification of managers by style for selection purposes and to perform RBSA and HBSA.

RBSA is a top-down approach that estimates the portfolio's sensitivities to security market indexes for a set of key risk factors. HBSA is a bottom-up approach that looks at the actual securities included in the portfolio at one time. Many of the advantages of RBSA are the same as for HBSA (e.g., determine key risk factors and return drivers, comparability between managers and through time, performed on a timely basis).

LOS 14.d

The capture ratio (CR) = UC ratio / DC ratio. The CR is a measure of return asymmetry; > 1 = positive asymmetry (convex shape) and < 1 = negative asymmetry (concave shape).

Drawdown is the total peak-to-trough loss for a specified time period; maximum drawdown is the largest peak-to-trough loss during that time period. Drawdown duration is the total time from when the drawdown begins to when the total drawdown recovers to zero (the latter achieved with offsetting gains).

LOS 14.e

The entire investment process should be driven by a succinct and precise investment philosophy. Some managers believe markets are very efficient and will execute passive strategies. Other managers believe markets are inefficient and can allow for those inefficiencies to be exploited when market prices of securities deviate from their intrinsic values; they will execute active strategies. Active managers will look at behavioral inefficiencies (shorter-term; caused by other investors and their behavioral biases) and structural inefficiencies (longer-term; caused by laws and regulations).

The investment decision-making process consists of four steps:

1. Idea generation
2. Idea implementation
3. Portfolio construction
4. Portfolio monitoring

Within portfolio construction, the key issues to consider include allocation, risk management, and liquidity.

LOS 14.f

Many investment decisions are made by teams rather than by individuals. Instead of relying on one individual, using a group to make investment decisions will help mitigate key person risk.

Investment teams' performance may be adversely affected by three common behavioral biases including groupthink, authority bias, and aversion to complexity.

Due diligence may determine whether or not a manager has built team structures and processes to deal with behavioral biases.

LOS 14.g

SMA and pooled investment vehicles are used to execute investment strategies. Pooled vehicles bring together the funds from all investors into one portfolio and there is no customization for any specific investor. SMA holds the funds of one investor in a separate account; the cost-benefit trade-off of holding investments in a SMA must be evaluated.

Compared to pooled investments, SMA has higher transaction costs but provides control, customization, tax efficiency, separate reporting, and greater transparency. Customized SMA requires an extra layer of due diligence to evaluate security selection, portfolio construction, and operational issues.

LOS 14.h

Closed-end funds and ETFs have the highest liquidity because they are traded intra-day. Open-end funds offer almost as much liquidity in that they are traded based on end-of-day NAV only.

Investments held in limited partnership structures (e.g., hedge funds, private equity, venture capital) usually involve investment capital that is tied up for more time.

Private equity and venture capital funds have the lowest liquidity because of capital calls; investors only receive returns after about five years into the 10-year average life of the funds. There may be the possibility to extend by the manager for up to two one-year periods, which further lowers liquidity.

With SMA, the liquidity is determined by the liquidity of the underlying assets.

LOS 14.i, 14.j

There are three basic forms of performance-based fees:

- Symmetrical structure with full upside and downside exposures
 - Fee = base + performance sharing
 - The greatest alignment between investor and manager incentives but increased risk to manager due to the full downside exposure
- Bonus with full upside and limited downside exposures
 - Fee = Greater of: (1) base, (2) base + sharing of positive performance
- Bonus with limited upside and downside exposures
 - Fee = Greater of: (1) base, (2) base + sharing of positive performance (within limit)

ANSWER KEY FOR MODULE QUIZZES

Module Quiz 14.1

1. **B** Quantitative analysis includes attribution and appraisal (as well as an analysis of the capture ratio and drawdown). Defining the universe is a separate step in the manager selection process, and investment due diligence is a component of qualitative analysis. (LOS 14.a)
2. **C** The greater the difference in the mean return between skilled and unskilled managers, the greater the opportunity cost of retaining and cost of hiring an unskilled manager. (LOS 14.b)
3. **B** When two distributions are not distinct, the unskilled managers are not expected to significantly underperform the skilled managers, implying a low opportunity cost of not hiring skilled managers. Inefficient markets are likely to exhibit larger differences of returns between skilled and unskilled managers. (LOS 14.b)

Module Quiz 14.2

1. **C** The data required for HBSA is likely to be more difficult to find than the data required for RBSA.
HBSA is more precise than RBSA; RBSA is a relatively imprecise tool that does not require a thorough computational effort but that may sacrifice accuracy. HBSA is typically easier for equity strategies. (LOS 14.c)
2. **C** A capture ratio (upside capture divided by downside capture) greater than one indicates the upside capture is greater than downside capture and reflects greater participation in rising markets than in falling markets. (LOS 14.d)

Module Quiz 14.3

1. **A** Passive strategies assume markets are efficient enough that active management does not add value that exceeds its transaction costs and fees. Therefore, the risk premiums being sought are only for bearing risk that is not easily diversified away, which is systematic risk.
Unsystematic risk is relevant for active strategies only. (LOS 14.e)
2. **B** Signal creation (idea generation) focuses on how investment ideas are generated and information is viewed in context of the efficient market hypothesis to determine whether it can be used to exploit inefficiencies. (LOS 14.e)
3. **C** SMAs can provide an instantaneous snapshot or “dashboard view” of the investment holdings at any given point. Pooled investments may be able to do so, but probably with a delay.
The tax benefits of a SMA would only accrue to investors who are taxable and would not benefit those who are tax exempt. SMAs generally have higher costs and fees than pooled investment vehicles. (LOS 14.g)
4. **B** Authority bias involves deferring decisions to a group member that is perceived to be an expert. In this case, the two other group members agreed with the former transportation research analyst regarding the stock recommendation. (LOS 14.f)

Module Quiz 14.4

1. **C** Private equity funds have the lowest liquidity because of capital calls. Closed-end funds have the highest liquidity because they are traded intra-day. (LOS 14.h)
2. **B** Management fees are charged as a fixed percentage based on assets, which results in a lower net return but no impact on the standard deviation of the returns.
Because incentive fees are charged as a percentage of returns (reducing net gains or reducing net losses), incentive fees lower the standard deviation of returns. (LOS 14.i)
3. **A** $2\% + [20\% \times (-3\% - 2\%)] = 1\%$.
(LOS 14.j)
4. **A** Higher of: (1) 0.4%, or (2) $0.4\% + [20\% \times (12\% - 3\%)] = 2.2\%$
(LOS 14.j)

READING 15

OVERVIEW OF THE GLOBAL INVESTMENT PERFORMANCE STANDARDS

EXAM FOCUS

GIPS is now considered part of ethics, which is 10–15% of the exam. Historically, GIPS was 0–5% of the exam and tested in the item set format. On rare occasions, it has been tested as a constructed response question.

GIPS falls pretty far down the list of favorite topics for most candidates. Like ethics, you must know the concepts and principles, then apply them to specific situations to identify compliance or non-compliance. There are a surprising number of calculation issues. To prepare for GIPS:

- **It is strongly advised you watch the videos that go with each module for this reading.**
- **Work practice questions.**

There are a couple of pitfalls to watch out for:

- This reading reflects the revised GIPS reading based on the 2020 edition of the GIPS standards, which have been updated from the 2010 standards.
- CFA Institute indicates that candidates are required to have knowledge from two CFA Institute readings: the curriculum reading, as well as relevant sections from a separate document on its website called the GIPS Standards for Firms. This SchweserNotes reading provides the key components from both in a single reading.
- Like ethics, it is easy to make up questions that cannot be answered. Exam questions are designed to test your understanding of the assigned material and not hypothetical real-world situations that would require additional research or delve into the sub-issues that can arise in GIPS.

Read the assigned material, work the practice questions, and there is every reason to do well on this section of the exam.



Video covering
this content is
available online.

MODULE 15.1: GIPS OVERVIEW

The GIPS Standards

The Global Investment Performance Standards (GIPS®) contain ethical and professional standards for the presentation of investment performance results. The GIPS are a *voluntary* set of standards. They are based on the fundamental principles of full disclosure and fair representation of performance results. When investment management firms comply with the GIPS, clients, prospective clients, and consultants are better equipped to fairly assess historical investment performance.

The GIPS are not all-encompassing because there is no practical way for a set of standards to address every possible situation a firm may face. The GIPS should, therefore, be viewed as a *minimum* set of investment performance presentation standards. Investment management firms should always include additional information in their performance presentations that would help current and prospective clients better understand the reported performance results.

The 2020 edition of the GIPS standards is delineated into three sections: standards for investment management firms, for asset owners, and for verifiers. Asset owners who manage assets for an organization, participants, or beneficiaries and *compete for business* would use the GIPS standards for firms. Asset owners who *do not compete for business* would use the GIPS standards for asset owners. Verifiers are third parties who provide verification that an investment firm is in compliance with GIPS standards. The LOS focus on the standards for investment management firms.

The GIPS standards provide a globally accepted method for calculating and presenting investment results to **prospective clients** and **prospective investors**. The definition includes those clients or investors who currently have funds at the firm, as well as those who don't. Clients are those that invest in a firm's strategies via a segregated account, whereas investors are those that invest in a firm's pooled funds. In the discussion of the GIPS standards, the terms *client* and *investor* are often used interchangeably.

When a firm claims compliance with the GIPS standards, the firms must calculate and present compliant returns in a **GIPS report**, which must be provided to all, not just some, of its prospective clients and investors. The GIPS report provides the firm's previous investment performance, as well as required and additional disclosures. It should be up to date and comparable to reports from other firms with similar strategies that also claim compliance.

Objectives, Scope, and Benefits of the GIPS

LOS 15.a: Discuss the objectives and scope of the GIPS standards and their benefits to prospective clients and investors, as well as

Objectives

The objectives of GIPS are as follows:

- Advance the interests of investors and increase their confidence in the investment industry.
- Provide accurate and comparable data to investors.
- Create a globally accepted standard for the determination and presentation of investment performance.
- Facilitate fair competition among global investment managers.
- Encourage self-regulation in the global investment industry.

Scope

Only investment management firms and asset owners who compete for business may claim compliance to the GIPS standards for firms. With respect to the terminology used to refer to a firm's assets under management, a **composite** is a collection of portfolios with similar investment mandates, objectives, or strategies. A **segregated account** is a portfolio owned by a single investor and is sometimes referred to as a separately managed account (SMA). A **pooled fund** is also a portfolio, but it is not owned by a single investor. Whereas broad distribution pooled funds are subject to regulation and are available to the general public (e.g., mutual funds), **limited distribution pooled funds** are not available to the general public (e.g., hedge funds).

The scope of the GIPS standards is as follows:

- GIPS compliance can only be claimed on a firm-wide basis.
 - GIPS compliance cannot be claimed for just some of an investment firm's products.
 - GIPS compliance cannot be claimed for only specific composites, pooled funds, or portfolios.
- To claim GIPS compliance, a firm must comply with all, not just some, of the applicable GIPS standards requirements.
 - The GIPS standards also include recommendations, which are optional but following them is consistent with best practices.
 - The GIPS standards will evolve over time as strategies and technologies change.
- A claim of GIPS compliance indicates, among other things, that:
 - A firm's data inputs, processes, and return calculations are compliant.
 - All the firm's fee-paying segregated accounts have been assigned to at least one composite.
 - All the firm's limited distribution pooled funds are included in a composite appropriate to their characteristics.
 - *Note:* Broad distribution pooled funds are only required to be in a composite if their strategy is also offered in separate accounts.



PROFESSOR'S NOTE

One way of thinking about the scope of the GIPS is that it can't be halfway. To be GIPS compliant, all customers should be provided a report, all the firm's products must be compliant, and all GIPS standards must be followed. Compliance with GIPS can't be halfway.

The exception to this is broad distribution pooled funds, which often do not have to be included in a composite, as previously noted. Why are they different? Think of it this way: Broad distribution pooled funds are typically government regulated such that investor protections have already been established.

Benefits to Prospective Clients and Investors

GIPS helps investors make sound decisions when choosing an investment manager because:

- GIPS compliance standardizes the determination and presentation of investment results, thereby making manager performance more comparable.
- Manager performance is more reliable when the firm is GIPS compliant.
- The **benchmark** requirements of GIPS can facilitate a discussion with the manager about the proposed investment strategy's past and targeted future performance.

Benefits to Investment Managers

Firms incur costs to ensure GIPS compliance. In return, GIPS may provide the following benefits:

- GIPS increase investor confidence in both the investment industry and the firm.
 - This is especially true if the firm is verified by a third party.
- GIPS compliance helps attract new investors who prefer or require their managers to be GIPS compliant.
- GIPS helps firms compete internationally because firm performance is comparable across borders.
- GIPS helps firms strengthen and maintain internal controls due to the recordkeeping and reporting required by GIPS.
- Firms may gain additional information about their operations due to the technology often adopted by firms to comply with GIPS.

MODULE 15.2: COMPLIANCE FUNDAMENTALS



Video covering
this content is
available online.

LOS 15.b: Explain the fundamentals of compliance with the GIPS standards, including the definition of the firm and the firm's

Definition of the Firm¹

A **firm** is defined as:

“an investment firm, subsidiary, or division held out to clients or potential clients as a distinct business entity.”

A **distinct business entity** is defined as:

“a unit, division, department, or office that is organizationally or functionally separated from other units, divisions, departments, or offices and that retains discretion over the assets it manages and that should have autonomy over the investment decision-making process.”

What are some characteristics for identifying a distinct business entity? An organization is more likely to be characterized as a distinct business entity if it has a distinct:

- Legal organization (e.g., as a separate subsidiary).
- Market.
- Client base.
- Investment process.
- Investment strategy.
- Investment staff such as portfolio managers and analysts.
- Physical location.
- Chain of command.



PROFESSOR'S NOTE

Why is the delineation of the firm and a distinct business entity important? Recall from LOS a that compliance with GIPS can't be halfway. Consider a national bank with two investment management divisions: one for high net worth investors (HNWI) and another for retail investors (RI). If the RI division wishes to become GIPS compliant but the HNWI division does not, the RI can only claim GIPS compliance if RI is held out to the public as a distinct business entity and could be characterized as a separate firm.

Note, however, that judgment is required to make the determination as to whether an organization should be characterized as a distinct business entity. Suppose a firm has two separate divisions but they use the same trading desk to execute their order. If all the desk does is buy and sell securities, then an argument could be made that both divisions are distinct business entities. If however, the trading desk helps value securities, then it is less likely that the divisions could be characterized as distinct business entities.

The definition of the firm affects the initial implementation of GIPS compliance and continuing compliance activities. It is also used to determine the **fair value of total firm assets**, which for the defined firm:

- Include discretionary and nondiscretionary assets.
- Include fee-paying and non-fee-paying assets.
- Are net of leverage used.
- Are only actual (not simulated) assets.
- Exclude advisory-only assets.
- Exclude uncalled, **committed capital** (i.e., capital that investors have pledged but which the firm has not yet drawn).

Fair value is defined as the value at which willing and knowledgeable parties would exchange an asset. It is most easily determined as the market value of identical assets in liquid markets. Discretionary assets are those where the manager has control of the investment strategy and include those assets managed by a subadvisor if the manager selects the sub-advisor. Nondiscretionary assets are those where client constraints materially affect the manager's ability to execute the strategy.

Note, however, that when calculating *composite* assets, not total *firm* assets, nondiscretionary assets are **not** included. Logically, this makes sense because when calculating composite performance, performance not controlled by the manager should not be attributed to the manager.

In the case of the excluded advisory-only client assets, the firm only offers investment advice and does not have trading authority for the assets.

Other Compliance Fundamentals

In addition to these basic concepts regarding compliance, there are also the following fundamentals.

- To initially claim compliance with the GIPS standards, the firm must attain compliance for a minimum of five years or for the period since firm inception if the firm has been in existence for less than five years.
- Firms must establish, update on a timely basis, and document policies and procedures for meeting GIPS. This includes policies for any GIPS recommendations voluntarily adopted and any error corrections.
- If the GIPS standards conflict with local laws and regulations, the firm must comply with local laws and regulations and disclose the conflict.
- The firm must not present performance-related information that is false or misleading, whether the information pertains to GIPS or not.
- The firm should provide an annual GIPS-compliant report to all existing clients for the composites in which that client's performance is included.
- Benchmarks must reflect the corresponding investment strategy and must be total return benchmarks, not price-only benchmarks.
- The firm must disclose all **material errors** and disclose corrected reports to current clients and verifiers.
- The firm must maintain data needed for GIPS compliance and must maintain a list of composites for the last five years.

MODULE 15.3: RETURN CALCULATIONS



Video covering this content is available online.

LOS 15.c: Discuss requirements of the GIPS standards with respect to return calculation methodologies, including the treatment of external cash flows, cash and cash equivalents, and expenses and fees.

Global Investment Performance Standards (GIPS®) for Firms, page 8

GIPS requires comparable calculation methods by all firms to facilitate comparison of results. For non-private market investment portfolios, returns must be calculated monthly. Portfolio returns must be calculated on a total return basis using beginning (BV) and ending fair value (EV). If there are no interim external cash flows, the return (R_t) during a time period is simply:

$$R_t = \frac{EV - BV}{BV}$$

In many cases, however, there are interim external cash flows (ECF), such as client withdrawals (outflows) or additional client contributions (inflows). Large interim ECFs can distort return calculations because the EVs are affected and it would be unclear how much of the return is due to client cash flows and how much is due to manager performance.

Ideally, to eliminate the potential distortion in returns due to ECFs, the investment would be valued each time an interim ECF occurs. The sub-period returns must then be geometrically linked to create a time-weighted rate of return (TWRR):

$$R_{TWRR} = (1 + R_1) \times (1 + R_2) \times (1 + R_3) \times \dots \times (1 + R_t) - 1$$

This computation is illustrated in the following example.

EXAMPLE: Time-weighted rate of return

The Rooney account was \$2,500,000 at the start of the month and \$2,700,000 at the end. During the month, there was a cash inflow of \$45,000 on day 7 and \$25,000 on day 19. The values of the Rooney account are \$2,555,000 and \$2,575,000 (inclusive of the cash flows for the day) on day 7 and day 19, respectively. **Calculate** the time-weighted rate of return (assuming 30 days in the month).

Answer:

First, calculate three subperiod returns using the rate of return calculation when external cash flows occur at the end of the evaluation period:

Subperiod 1 (days 1–7)

$$r_{t,1} = \frac{[(\$2,555,000 - \$2,500,000) - \$45,000]}{\$2,500,000} = 0.004 = 0.4\%$$

Subperiod 2 (days 8–19)

$$r_{t,2} = \frac{[(\$2,575,000 - 2,555,000) - 25,000]}{\$2,555,000} = -0.002 = -0.2\%$$

Subperiod 3 (days 20–30)

$$r_{t,3} = \frac{(\$2,700,000 - 2,575,000)}{\$2,575,000} = 0.049 = 4.9\%$$

Second, compound the returns together (chain-link) to calculate an overall time-weighted rate of return:

$$TWRR = (1 + 0.004)(1 - 0.002)(1 + 0.049) - 1 = 0.051 = 5.1\%$$

In the previous example, the account was valued every day there was an interim ECF. Calculating a TWRR this way is referred to as a true or exact TWRR because, due to the interim valuations, the TWRR is not distorted by the ECFs.

However, sometimes a firm does not value its portfolios every day. Furthermore, if the ECFs are relatively small, then approximations of the monthly return will provide a close estimate of the true TWRR. The methods of calculating an approximate return under the GIPS standards are as follows.

Approximations

Modified Dietz Return

The Modified Dietz return method adjusts the simple return formula as follows:

$$R_{MD} = \frac{EV - BV - ECF}{BV + \text{adjusted ECF}}$$

For example, assume a portfolio experienced cash inflows from client contributions. The cash inflows are subtracted from the ending value and adjusted cash inflows are added to the beginning value. The numerator's logic is that a manager should not get credit for a client's contribution while in the denominator it is recognized that the manager had use of that cash inflow for part of the period, as demonstrated in the following.

In the previous Rooney account example, the adjusted ECFs are calculated using partial month weightings (W) as follows:

ECF	Weight (W)	Adjusted ECF
\$45,000	$(30 - 7) / 30 = 23 / 30$	$23 / 30 \times \$45,000 = \$34,500$
\$25,000	$(30 - 19) / 30 = 11 / 30$	$11 / 30 \times \$25,000 = \$9,167$

The 1st ECF was received on Day 7, meaning that the manager had use of it for 23 days. The manager had use of the 2nd ECF for 11 days. Using these in the formula for the Modified Dietz return (R_{MD}):

$$R_{MD} = \frac{\$2,700,000 - \$2,500,000 - \$45,000 - \$25,000}{\$2,500,000 + \$34,500 + \$9,167} = 5.1\%$$

In the example, if the ECFs were cash outflows such as client withdrawals, they would have been denoted with a negative sign.

MIRR

A second approximation is the modified internal rate of return (MIRR). It is simply an internal rate of return (IRR) that adjusts for the timing of the ECFs. It can be solved for by trial and error or spreadsheet to find the interest rate (r) that equates the EV to the future value of the BV and ECFs. Like Modified Dietz, each ECF is weighted by the days of the month.

In the calculation that follows, the ending three zeros (000) are dropped to simplify, and the remainder-of-month periods are calculated to two decimal places.

$$2,700 = 2,500(1 + r) + 45(1 + r)^{0.77} + 25(1 + r)^{0.37}$$

$$\text{MIRR} = 5.1\%$$

Since both the Modified Dietz and MIRR use the number of days in the month, they are said to be methods that adjust for daily-weighted ECFs. The Modified Dietz and MIRR typically provide similar values.

Regardless of whether the exact method or the approximations (Modified Dietz or MIRR) are used, GIPS requires that the monthly returns be geometrically linked to calculate an annual return. The larger the ECFs and the more volatile the market, the greater the discrepancy will be between the true TWRR and the approximations.



PROFESSOR'S NOTE

The previously calculated exact TWRR was 5.1%, making the approximations very close. This is not surprising, given that the ECFs were relatively small. If the ECFs are relatively small and the path of returns does not vary significantly by subperiod, the methods will produce similar results.

Solving for the MIRR by trial and error is not an LOS and not covered in the CFA reading. Note that the MIRR defined here is not the same as the MIRR you may have encountered in a corporate finance class. Although they are both IRRs, they differ in how they “modify” the IRR.

To recap, under the GIPS requirements:

- Firms must calculate monthly returns for non-private market investment portfolios.
- If a firm calculates daily valuations and returns, the daily return must be geometrically linked to create a monthly true TWRR.
- If a firm does not calculate daily returns and the ECFs are not large, approximations to the true TWRR that do not require an interim valuation can be used.
- If the ECFs are large, the portfolio must be valued at the time of the ECFs to calculate a subperiod return.
- Regardless of how the monthly return is calculated, the monthly return must be geometrically linked to create an annual return.

For portfolios other than non-private market investment portfolios, what are the GIPS requirements?

- Private market investment portfolios values and returns must be calculated quarterly (e.g., real estate, private equity, and other illiquid, not publicly traded, investments).
- Pooled funds not in a composite must be valued and returns calculated at least annually.
 - The fund must also be valued and a subperiod return calculated at the time of subscriptions or redemptions.

What constitutes a **large cash flow**?

- The definition of a large ECF is determined by each firm for each composite.
- Generally, a large ECF is that which is large enough to affect the return calculation.
- The firm's policy for the determination of a large cash flow must be documented.

Other Return Calculation Topics

In addition to the return calculations discussed previously, the GIPS standards have other requirements.

There are some investment strategies where the firm controls the timing and size of the ECFs. In these cases, a money-weighted return (MWR) will be more representative of the manager's skill than the TWRR. MWRs can be used instead of TWRRs if:

- The firm has control of the timing of ECFs.
- The portfolios are closed-end, or fixed life, or fixed commitment, or have a significant amount of illiquid assets.

The MWR (which is an IRR calculation) must be calculated and the portfolios valued at least annually.

Other return calculation requirements are as follows.

- Trade date, not settlement date, prices must be used to calculate returns.
- Partial year returns cannot be annualized.
 - This would be equivalent to representing simulated returns as actual returns, which is not allowed under GIPS.
- Total returns, which include income and capital gains/losses, must be used.
 - For investments that generate income, such as bonds, accrual accounting must be used.
 - Returns must reflect the manager's allocations to cash and cash equivalents.
 - This is true even if the firm uses an outside firm to manage the cash.
 - Cash equivalents include money market instruments and fixed-income securities with maturities less than a year.



PROFESSOR'S NOTE

Once again, we can think of GIPS as not being half- or partway. Total, not just price, returns must be used and one can't assume that a partial-year return

would continue for the entire year (i.e., it can't be annualized). Also, it makes sense that returns must reflect cash returns. A manager may not want to, given the low returns to cash, but this would not be consistent with the fair representation of the manager's returns.

- Under GIPS, the presented **gross-of-fees** return must have been calculated after the deduction of transactions costs.
- **Transactions costs** reflect the costs of buying and selling securities.
 - Examples include brokerage commissions, spreads, exchange fees.
 - For private market investments, they can also include legal, advisory, and other fees.
 - **Custody fees** should not be included.
 - Transactions costs can be estimated but only if they are unknown.
- In some cases, portfolios pay **bundled** or **all-in-fees**, which can include trading costs, as well as **investment management**, custody, **administrative**, and other fees.
 - In this case, the presented gross-of-fees return must be reduced by:
 - the portion of the bundled fee due to transactions costs; or
 - the entire bundled fee if the transactions costs cannot be separated out.



PROFESSOR'S NOTE

The emphasis here on returns that are reduced by trading costs but not investment management costs might seem surprising, given that management fees reduce investors' returns. However, it is recommended that net-of-fees returns, reflecting management fees (4.B.1), are also presented. It is also the case that different investors pay different fees. For example, those with more assets often pay lower management fees in percentage terms. Not surprisingly, then, it is required that investors be provided with a fee schedule (4.C.11).



MODULE QUIZ 15.1, 15.2, 15.3

1. Assume that Firm Z is the investment manager for 15 retail clients and has full discretion over the investment of the clients' assets. At the end of each day, any excess cash in the portfolios is swept into a money market fund. Firm Z does not manage the money market fund, so it does not include the cash portion of the portfolio in its total return performance calculation. **Discuss** whether it is an acceptable practice for Firm Z to claim compliance with the GIPS.

2. Consider the total quarterly returns for the growth and income composite of the investment firm ADA: Q1 = 3.00%, Q2 = 4.15%, Q3 = 3.75%, and Q4 = 3.15%. **Calculate** the appropriate total annual return under the calculation methodology

under the GIPS.

3. For promotional purposes, the Jaspre Investment Management firm (JIM) wants to take advantage of the prestige associated with presenting performance results that are in compliance with the GIPS. To save time and expense, JIM decides to create five composites for marketing purposes. These portfolios represent 60% of the firm's fee-paying discretionary portfolios. Recognizing that the firm cannot claim compliance for all of its portfolios, JIM plans to include the following compliance statement with its performance presentation: *"The investment results presented in this report have been prepared and presented in compliance with the Global Investment Performance Standards (GIPS®) for the majority of the assets under management by Jaspre Investment Management, Incorporated."* **Discuss** whether JIM's claim of compliance is acceptable under the GIPS.
4. Kenzo Fund Managers (KFM) manages a fund that has the following cash flows and valuations (in U.S.\$ millions) for the month of September:

Date	Value (Before Cash Flow)	Cash Flow	Value (After Cash Flow)
1 September	50.0	N/A	50.0
10 September	51.5	5.0	56.5
20 September	59.0	-2.0	57.0
30 September	55.0	N/A	55.0

- (a) **Calculate** the approximate TWRR for September using the Modified Dietz method.
- (b) **Calculate** the exact TWRR for September revaluing the portfolio at every ECF.
5. It would be *most likely* that the money-weighted returns could be used instead of time-weighted returns if the:
 - A. account is large.
 - B. account is non-discretionary.
 - C. manager can control the timing of external cash flows into and out of the portfolio.

MODULE 15.4: COMPOSITES



Video covering
this content is
available online.

LOS 15.e: Explain requirements of the GIPS standards with respect to composite return calculations, including methods for asset-weighting portfolio returns.

Global Investment Performance Standards (GIPS®) for Firms, page 13

Composites are groupings of one or more portfolios with similar investment mandates, objectives, or strategy. Because composite returns are an essential part of the firm's communication with investors, the GIPS standards require that composite return calculations be calculated at least monthly, except for private market investments and pooled funds not in a composite, which must be calculated at least quarterly and annually, respectively. Composite returns must be calculated in one of three ways:

1. Asset-weighting portfolio returns by beginning-of-period values
2. Asset-weighting portfolio returns by both beginning-of-period values and ECFs

3. The aggregate method

The first method is perhaps the simplest as each portfolio return is just multiplied by its beginning of period weight. The second method is similar except that we also adjust for the ECFs. The third method uses total composite values at the beginning and end of period. The weighting of ECFs in the second and third methods will look familiar to you from the Modified Dietz method covered previously.

EXAMPLE: A U.S. manager's equity composite contains three portfolios. The following values for the month of October show the external cash flows and the beginning and ending portfolio values. The values are in \$ millions.

Portfolio	30-Sep	3-Oct	13-Oct	19-Oct	31-Oct
A	\$110.00			-\$10.10	\$109.20
B	\$167.80		-\$11.10		\$166.90
C	\$344.20	\$22.00			\$345.10
Total	\$622.00	\$22.00	-\$11.10	-\$10.10	\$621.20

Questions:

- Calculate** the Modified Dietz return for each portfolio.
- Calculate** the composite return using beginning of period portfolio values.
- Calculate** the composite return using beginning of period portfolio values with external cash flows.
- Calculate** the composite return using the aggregate return method.

Answers:

- Positive signs for the ECF denote cash inflows such as client contributions, and negative signs denote cash outflows such as client withdrawals. The adjustments to the ECFs result in partial month weightings (W) of each cash flow as follows:

Portfolio	ECF	Weight (W)	Adjusted ECF
A	-\$10.10	$(31 - 19) / 31 = 12 / 31$	$12 / 31 \times -\$10.10 = -\3.91
B	-\$11.10	$(31 - 13) / 31 = 18 / 31$	$18 / 31 \times -\$11.10 = -\6.45
C	\$22.00	$(31 - 3) / 31 = 28 / 31$	$28 / 31 \times \$22.00 = \19.87

Using these in the formula for the Modified Dietz return (R_{MD}):

$$\text{Portfolio A: } R_{MD} = \frac{\$109.20 - \$110 - -\$10.10}{\$110 - \$3.91} = \frac{\$9.30}{\$106.09} = 8.77\%$$

$$\text{Portfolio B: } R_{MD} = \frac{\$166.90 - \$167.80 - -\$11.10}{\$167.80 - \$6.45} = \frac{\$10.20}{\$161.35} = 6.32\%$$

$$\text{Portfolio C: } R_{MD} = \frac{\$345.10 - \$344.20 - \$22}{\$344.20 + \$19.87} = \frac{\$21.10}{\$364.07} = -5.80\%$$

Notice that for Portfolio A, even though the ending value of \$109.20 was lower than the beginning value of \$110.00, the return was positive because the client withdrew \$10.10 from the portfolio during the month. The same pattern holds for Portfolio B.

The opposite is true for Portfolio C. Although the ending value was greater than the beginning value, the return is negative. The client had contributed additional capital of \$22.00 during the month, and once we factor this additional contribution in, the return is negative.

- b) To calculate the composite return using beginning of period values, first find the weights of each portfolio in the composite:

$$A: \frac{110.00}{622.00} = 17.68\%; B: \frac{167.80}{622.00} = 26.98\%; C: \frac{344.20}{622.00} = 55.34\%$$

The composite return is the sum of the weights times the returns:

$$= 0.1768 \times 8.77\% + 0.2698 \times 6.32\% + 0.5534 \times -5.80\% \\ = 1.5505\% + 1.7051\% + -3.2097\% = 0.05\%$$

- c) To calculate the composite return using beginning of period portfolio values with external cash flows, first find the weights of each portfolio in the composite. Since the denominator of the Modified Dietz formula for each portfolio factors in the beginning values and weighted cash flows, it can be used to obtain the weightings. Using the previously noted figures, the total for the composite is \$106.09 + \$161.35 + \$364.07 = \$631.51. The weights are then:

$$A: \frac{106.09}{631.51} = 16.80\%; B: \frac{161.35}{631.51} = 25.55\%; C: \frac{364.07}{631.51} = 57.65\%$$

The composite return is the sum of the weights times the returns:

$$= 0.1680 \times 8.77\% + 0.2555 \times 6.32\% + 0.5765 \times -5.80\% \\ = 1.4734\% + 1.6148\% + -3.3437\% = -0.25\%$$

Notice that under this method, the composite return is slightly negative, whereas in the previous method, the return was positive. This is because under this method, the weighted cash flows are figured in and Portfolio C's early in the month cash flow results in a larger Portfolio C weighting. Thus, Portfolio C's negative return has more influence in the composite's return than under the previous method.

- d) In the aggregate return method, the composite is treated as a single portfolio of its constituents and the return is calculated using the Modified Dietz formula. In the numerator, we use the total of the portfolio values and cash flows from the bottom of the table. In the denominator, the total of the portfolios' Modified Dietz values from the previous method are used.

$$R_{MD} = \frac{\$621.20 - \$22 -- \$11.10 -- \$10.10 - \$622}{\$631.51} = \frac{-\$1.60}{\$631.51} = -0.25\%$$

In many cases, the second and third method for calculating the composite return will produce the same result.

Discretion and Composite Construction

LOS 15.f: Explain the meaning of “discretionary” in the context of composite construction and, given a description of the relevant facts, determine whether a portfolio is likely to be considered

Global Investment Performance Standards (GIPS®) for Firms, page 18

As mentioned previously, composites are groupings of similar portfolios. The GIPS standards specify requirements for composite construction so that investors are provided a fair and accurate representation of manager performance. The intent of the requirements is to, in part, prevent managers from excluding poorly performing portfolios from composites.

A key determinant in whether a portfolio is included in a composite is whether the manager has discretion. Whether a portfolio is discretionary hinges on the manager's ability to implement the investment strategy. If the performance of a portfolio does not reflect a manager's decisions (i.e., the portfolio is nondiscretionary), then that portfolio would be excluded from the calculation of composite returns.

Generally speaking, the requirements for what *must* be included in at least one composite are as follows:

- All actual, fee-paying, discretionary segregated accounts.
- Pooled funds that are also offered as segregated accounts.
 - These include limited distribution pooled funds, as well as broad distribution pooled funds that have strategies also offered to individuals through a separate account.

In general, the requirements for what must not be included in a composite are as follows:

- Nondiscretionary accounts.
- Pooled funds that are not also offered as segregated accounts (e.g., a broad distribution pooled fund—which is typically government regulated).
- Simulated portfolios.

Non-fee-paying, discretionary segregated accounts may be included with additional disclosures.

While these general guidelines are succinctly stated, their implementation is subject to judgment, which necessitates the discussion that follows.

**PROFESSOR'S NOTE**

It might seem strange that a portfolio could be in more than one composite. However, consider a value portfolio. The portfolio must be included in both the value composite and the small cap value composite (assuming that the portfolio meets the inclusion criteria for both composites). Note, however, that the firm should be careful to not double count the portfolio's assets when determining total firm value.

Discretion

- Given its importance, a firm must maintain and apply a clear, written definition of discretion.

- A client's investment policy statement (IPS) will specify risk preferences and constraints.
 - These include:
 - The benchmark the manager is measured against.
 - Risk controls such as limits on equity sector weights, bond credit quality, and the use of derivatives.
 - Environmental, social, and governance (ESG) preferences.
 - Restrictions on the sale of company stock.
 - Limits on the sale of low basis stocks to avoid high taxation.
 - Legal restrictions (e.g., a government fund can only hold domestic securities).
 - However, none of these *automatically* make a portfolio nondiscretionary (i.e., there are degrees of discretion).
 - Guidance is based on whether the manager's ability to use professional judgment is materially constrained.
 - For example: If an IPS constraint limits the use of derivatives and the manager does not normally use derivatives anyway, the portfolio would likely be deemed discretionary.
 - If the constraint is deemed immaterial, the manager can:
 - Place the portfolio in a composite with similar, unconstrained portfolios.
 - If the constraint is deemed material, the manager should:
 - Group the portfolio with similar, constrained portfolios.
 - Exclude the portfolio from all composites.
 - In some cases, there may be restrictions for particular assets (as in the sale of low basis stock mentioned previously). In these cases, a manager may:
 - Consider the entire portfolio nondiscretionary; or
 - Remove these assets and place the remainder of the portfolio in a composite; or
 - Consider the entire portfolio discretionary if the restricted assets value is below a certain percentage of the portfolio, as stated in their policy.
- In some cases, its ECFs might indicate that a portfolio is nondiscretionary.
 - For example: A client makes large withdrawals that necessitates a large cash balance, restricting the manager's ability to invest in equity positions to the degree as with other portfolios in the composite.

Model Portfolios

- Simulated portfolios cannot be in a composite.
- These portfolios are called hypothetical, model, or **theoretical** portfolios.
- They are often based on the backtesting of data.
- Their performance can be provided in **supplemental** information, but not in composite results.

- Note that any information the firm provides that is supplemental to the GIPS requirements must be labeled as such and must not contradict or conflict with required GIPS disclosures.
- However, sometimes a firm will use its own funds (seed money) to create a new strategy.
 - The performance for these actual portfolios can be included in existing or new composites.
 - These portfolios would be subject to the disclosure requirements for non-fee-paying portfolios.

Non-Fee-Paying Portfolios

- Non-fee-paying portfolios may be included in a composite, but the firm is not required to.
- If included, firms are required to disclose the percentage of composite assets represented by non-fee-paying portfolios.

Composite Construction

LOS 15.g: Explain the role of investment mandates, objectives, or strategies in the construction of composites.

Global Investment Performance Standards (GIPS®) for Firms, page 18

A critical step in achieving an accurate and comparable representation of a firm's performance is the defining and construction of composites. As per the GIPS standards, composites must:

- Be determined by investment mandate, objective, or strategy.
- Contain all portfolios that match the composite definition.
- Be based on criteria that is documented in the firm's policies and procedures.
- Be defined such that clients are able to compare the performance of one firm to another.
- Be representative of the firm's products and be consistent with the firm's marketing strategy.

The list just described is straightforward, but applying the list items in practice is more difficult. A starting point in composite construction might be competitors' composite classifications and/or the styles requested by potential investors. A composite's construction will have lasting presentation consequences and should thus be constructed carefully. A composite definition too narrow (e.g., small cap value frontier market stocks) results in too few portfolios in each, creates unnecessary costs, and potentially jeopardizes client confidentiality. A composite definition that is too broad results in disparate performance among composite portfolios.

The following are examples on which to base composite construction:

- Equity style.

- The benchmark.
- Equity or bond sector.
- Risk/return profile using measures such as tracking error.
- Whether active, passive, or core plus management is used.
- Investment strategy such as sector rotation, fundamental analysis, etc.

The Inclusion and Exclusion of Composite Portfolios

LOS 15.h: Explain requirements of the GIPS standards with respect to composite construction, including switching portfolios among composites, the timing of the inclusion of new portfolios in composites, and the timing of the exclusion of terminated portfolios from composites.

Global Investment Performance Standards (GIPS®) for Firms, page 18

Over time, a portfolio manager will gain new clients, lose others, and have clients who change their objectives. The treatment of these portfolios will affect the composite's return. Because unethical managers may be tempted to move their best-performing portfolios to a particular composite, the GIPS standards specify requirements regarding the movement of portfolios in and out of composites. As such, the GIPS standards require firms to have policies for:

- When portfolios are included in composites.
- When portfolios are excluded from composites.
- Switching a portfolio from one composite to another.
- Cash flows from new investments or liquidations.
- The minimum asset level for a composite.

The firm's policy should be established on a composite-by-composite basis and applied in a timely, consistent manner. We discuss each of these as follows.

Portfolio Inclusion

- New portfolios should be included in a composite at the beginning of the next full measurement period.
 - For example: If a portfolio is funded with cash on July 6 and the firm calculates composite returns monthly, the new portfolio should be included in the composite on August 1.
- However, the firm has discretion on the timing of portfolio inclusion because it may take time to invest new funds. This is often the case when:
 - The investment is made in illiquid securities such as in emerging markets; or
 - The investment is funded with other securities that must be sold before new securities are bought.

- Thus, the firm's documented policy may vary by composite, with some composites allowing for longer periods prior to portfolio inclusion.

Portfolio Exclusion

- Terminated portfolios should be included in a composite through the last full measurement period in which the firm had discretion.
- Clients sometimes direct a firm to stop trading an account or transfer control to a new manager before the portfolio is fully liquidated.
 - For example: Suppose on June 4 a client notifies a firm to stop trading because they will be leaving the firm on July 9. In this case, the portfolio should be included in the composite only through May 31.

Switching Portfolios

- A portfolio can be switched to a new composite due to actions by the client or by the firm.
 - A client may change the portfolio's mandate, objective, or strategy.
 - For example: A client now allows the use of derivatives, so the portfolio is switched to a composite that allows such.
 - The firm may redefine the composite such that the portfolio is no longer appropriate for the composite.
 - Redefining a composite by a firm should be highly unusual.
 - In most cases, a firm should create a new composite instead.
- When a portfolio is switched to a new composite, the portfolio's performance must remain in the old composite's historical performance.

Significant Cash Flows

- Significant cash flows are those large enough such that it impedes the firm from implementing the strategy on a timely basis.
 - For example: A client contribution/withdrawal may be so large that it can't be invested/divested quickly in an illiquid market.
 - The firm should document what constitutes "significant" in its policies.
- To prevent composite performance from being affected by cash inflows/outflows in the event of significant cash flows, a firm can:
 - Temporarily exclude the portfolio from the composite; or
 - Create and report on a **temporary new account** (outside of the composite), which would contain:
 - Cash contributions until they can be invested; or
 - Securities until they can be divested.

Minimum Asset Levels

- A portfolio may be excluded from a composite if its size is so small that it can't be invested appropriately by a firm.
- As portfolios change in size, they must be added to or removed from a composite as per firm policy regarding the size limits for adding and removing portfolios.
 - For example: A portfolio must be added to a composite if its size rises above €5 million but removed if it falls below €4.5 million.
- The minimum asset level must be specified in advance and portfolios that are removed cannot have their prior performance removed from the composite's historical record.

EXAMPLE: Account #207 invests in illiquid, fixed income securities. The account receives a large cash infusion on April 12 that cannot be invested quickly at reasonable prices. It is expected to take 60 days for the funds to be reasonably invested.

Best Solution:

Place the funds in a new, temporary, subaccount (call it 207T) until the funds are invested. Continue to report results for 207 in its appropriate composite. Results for 207T will not be reported in any composite. Once 207T is invested in accord with account objectives, 207T will be merged into 207 and affect future results for 207. (Note that the client will need to receive reports showing the results of 207T and 207 to comply with general reporting requirements under the Standards of Professional Conduct. Subaccount 207T is only excluded from GIPS reporting.)

Alternative Solution:

The funds could be placed directly into 207 and 207 results would be excluded from the composite results until the funds are invested in accord with client objectives. GIPS composite results are based on monthly results so if the investments are completed by June 15, account 207 will be excluded from the composite for months April, May, and June. (Note that the client will need to receive reports showing the results of 207 to comply with general reporting requirements under the Standards of Professional Conduct. Account 207 is temporarily excluded from GIPS reporting.)



MODULE QUIZ 15.4

1. The investment management firm of Rangan, Rollins, and Cramer (RRC) manages portfolios using a long-short strategy. However, RRC does not ever intend to market this strategy and, thus, does not include the performance of these portfolios in any of the firm's composites. **Discuss** whether this practice is acceptable if RRC claims that its performance presentation results are compliant with the GIPS.
2. The Teletron Investment Management firm (TIM) plans to market an aggressive growth investment strategy using a newly developed proprietary prediction model. To test the model, TIM created an aggressive growth composite and produced a years of returns history using hypothetical assets and a back-tested asset allocation strategy. TIM intends to show the model composite results in its performance

presentation. **Discuss** whether this practice is acceptable under the GIPS.

3. For each of the following client portfolio characteristics choose, according to the GIPS requirements, whether the characteristic *may be included* or *must be excluded* from a composite and **explain** your decision.

i. Client has significant liquidity needs with an accompanying significant cash position.

A. May be included.

B. Must be excluded.

Explain your decision.

ii. Client does not pay fees.

A. May be included.

B. Must be excluded

Explain your decision.

iii. Client requests strictly following an index.

A. May be included.

B. Must be excluded

Explain your decision.

4. Johnson Investment Management (JIM) uses monthly valuation. Assuming the general provisions of GIPS apply, **discuss** when it would be appropriate to remove a portfolio from JIM's composite if the portfolio is terminated on July 15, 2015.

5. A U.K. manager's composite contains two portfolios. The following values for April show the external cash flows and the beginning and ending portfolio values. The values are in £ millions.

Portfolio	31-Mar	12-Apr	20-Apr	22-Apr	30-Apr
A	£400.00	£25.00		£10.00	£467.00
B	£200.00		-£13.00		£224.00
Total	£600.00	£25.00	-£13.00	£10.00	£691.00

(a) **Calculate** the Modified Dietz return for each portfolio.

(b) **Calculate** the composite return using beginning of period portfolio values.

(c) **Calculate** the composite return using beginning of period portfolio values with external cash flows.

(d) **Calculate** the composite return using the aggregate return method.

MODULE 15.5: GIPS PRESENTATION AND REPORTING



Video covering
this content is
available online.

LOS 15.i: Explain requirements of the GIPS standards with respect to presentation and reporting.

LOS 15.j: Explain the conditions under which the performance of a past firm or affiliation may be linked to or used to represent the

Global Investment Performance Standards (GIPS®) for Firms, page 21

GIPS requires that, when marketing a particular investment strategy, firms must make every reasonable effort to provide a GIPS report to prospective clients and limited distribution pooled fund investors. There are two types of GIPS reports, **GIPS Composite Reports** and **GIPS Pooled Fund Reports**. The curriculum focuses specifically on the requirements for Composite Time-Weighted Return Reports. As such, that should be your focus too. The requirements for Composite Time-Weighted Return Reports include the following.

Performance History

Upon GIPS adoption, firms are required to present GIPS compliant annual performance for:

- At least 5 years.
 - Unless the composite has been in existence for less than 5 years.
- And then extended each year until the firm builds a 10-year GIPS compliant history.

Returns and Size Measures

The report must include the following:

- Time-weighted returns for the composite and benchmark.
- The amount of firm assets.
- The amount of composite assets.
 - The number of portfolios in the composite if there are six or more.
 - Note that there is no minimum number of portfolios for a composite to be formed.

Risk

The report must include annual measures of internal composite dispersion, benchmark dispersion, and composite dispersion as a whole. **Internal dispersion** measures the variability of portfolio returns within the composite, whereas the latter two measures allow the client to compare the composite's historical risk against a benchmark. It might be useful to think of the first as a micro measure and the latter two as macro measures.

Internal dispersion

- This allows the client to determine how consistent portfolio performance is within the composite.
- A very large internal dispersion may indicate that:
 - The firm was not successful in consistently implementing the composite strategy; and/or

- The composite definition is too broad.
- Only portfolios in existence for the entire year can be included in internal dispersion calculations.
- Acceptable methods of calculating internal dispersion include:
 - High and low returns.
 - Range.
 - Equal-weighted standard deviation.
 - Asset-weighted standard deviation.
 - Or another measure chosen by the firm that fairly represents the composite's internal dispersion.

EXAMPLE: Internal dispersion

The following figure illustrates the structure of a composite during 2020. An *X* indicates that the portfolio was included in the composite for the quarter. If a cell is blank, the portfolio was not included in the composite for the entire quarter.

Determine which portfolios should be contained in the internal dispersion measure for 2020.

Figure 15.1: Composite Structure, 2020

Portfolio	Quarter 1	Quarter 2	Quarter 3	Quarter 4
A	X	X	X	X
B	X	X	X	
C	X	X	X	X
D		X	X	X
E	X	X	X	X
F			X	X

Answer:

Based on the information contained in the previous figure, Portfolios A, C, and E would be included in the internal dispersion measure for 2020. Portfolios B, D, and F should be excluded from the calculation of the composite's 2020 internal dispersion because they do not have an entire year of performance results. Note that this is only three portfolios to include in the dispersion calculation. Unless there are other portfolios with a full year of data to include in the calculation, no dispersion will be reported. Six or more are required to report dispersion.

The measures of dispersion suggested by the reading include the following:

- The range of annual returns.
- The high and low annual returns.
- The standard deviation of equal-weighted annual return.
- The asset-weighted standard deviation of annual returns.

The **range** of annual returns and the **high and low** annual returns are the simplest and most easily understood measures of dispersion. The advantages of these measures include simplicity, ease of calculation, and ease of interpretation. Disadvantages include the fact that an extreme value can skew the data, and they do not stand alone as adequate risk measures.

The **standard deviation** across equally weighted portfolios is the most widely accepted measure of dispersion within a composite. It is calculated as:

$$\sigma_C = \sqrt{\frac{\sum_{i=1}^n [R_i - \text{MEAN}(R)]^2}{n - 1}}$$

where:

R_i = return on portfolio i

$\text{MEAN}(R)$ = equal-weighted mean (composite) return

n = number of portfolios



PROFESSOR'S NOTE

The use of either n or $n - 1$ in the denominator can be supported, and firms are encouraged to disclose how they calculate standard deviation.

The *standard deviation with asset-weighted composite* returns is calculated in the following manner:

$$\text{dispersion} = \sqrt{\sum_{i=1}^n w_i (R_i - C_{\text{ASSET}})^2}$$

where:

R_i = unweighted return on portfolio i

w_i = market weight of portfolio i relative to the market value of the composite

C_{ASSET} = composite's asset-weighted return, or $C_{\text{ASSET}} = \sum w_i R_i$

Composite and benchmark dispersion

The firm should also present the historical dispersion for the benchmark and the composite as a whole, using the *ex post* standard deviation.

The standard deviation must be presented:

- For each annual period.
- For the composite and benchmark.
- Using the previous three years of data on an annualized basis.

Portability

When one firm acquires or joins with another firm, group of managers, or manager, the new firm can link their performance to the previous firm's historical performance if:

1. Substantially all the investment decision makers are retained by the new firm.
2. The decision-making process remains substantially intact and independent within the new firm.

3. The new firm has records that document the previous firm's historical performance.
4. There is no break in the performance record between the new and previous firm.

If only the first three conditions are met, then the previous firm's historical performance can be used to represent that of the new firm, but the records may not be linked. For example, if the previous firm's employees take a garden (temporary) leave at the time of acquisition, the composite assets will not be managed for that period and there will be a break in the presented performance for that time period.

Last, if the new firm is GIPS compliant but the previous firm is not, then the new firm has one year to bring the assets into compliance for future reporting.

Advisory-Only Assets and Uncalled, but Committed Capital

As previously mentioned, advisory-only assets and uncalled, but committed, capital cannot be included in total firm assets. However, the firm can report information on them on a separate basis or combined with composite or firm assets. If reported on a combined basis, the firm must also report on that for the advisory only and for the uncalled, but committed, assets. In any case, the firm must clearly label the assets that are advisory-only and uncalled, but committed.

MODULE 15.6: THE VALUATION HIERARCHY



Video covering this content is available online.

LOS 15.d: Explain the recommended valuation hierarchy of the GIPS standards.

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Fair value is the amount an asset would be sold in an arm's-length transaction between willing and knowledgeable parties. The GIPS standards provide a recommended valuation hierarchy for determining fair value. Fair value should include accrued income for bonds and other income-generating assets. In the case of cash, income may be accounted for on a cash or accrual basis. Firms must document their valuation process and methodologies, which should be composite—or pooled fund specific.

The GIPS recommended valuation hierarchy is in descending order of usage. A method lower in the hierarchy is used only when all methods higher in the hierarchy are unavailable. The fair value hierarchy is as follows:

1. The quoted price for an identical asset in a liquid market on the same day.
2. The quoted price for a similar asset in a liquid market on the same day.
3. The quoted price for identical or similar assets in markets that are not active.
 - a. For example: A stock trades infrequently such that the last available price is days old.
4. A value based on market inputs.

- a. For example: Applying the P/E ratio for comparable securities to the firm's earnings.
5. A subjective value that is unobservable.
 - a. This is a last resort and should only be used to measure fair value when observable inputs and prices are not available or appropriate.
 - b. If used, the firm must disclose the assets valued this way as a percentage of composite assets.



MODULE QUIZ 15.5, 15.6

1. Alan Tribon, compliance officer at Frankfurt Investment Management, has scheduled a meeting with one of Frankfurt's portfolio managers, Ashon Guptar, to discuss an investment performance presentation that he recently prepared.

The following are excerpts from the conversation between Tribon and Guptar:

Excerpt 1

Tribon: "I see that the returns in the presentation are reported gross of return of investment management fees. I seem to recall that the GIPS require firms to present performance on a net of management fees basis."

Guptar: "You are correct, and I will promptly see that the performance results are recalculated and the presentation is changed to reflect net-of-fees performance."

Excerpt 2

Tribon: "I notice that there is disclosure of total firm assets for each period. I know this has always been a GIPS requirement, but must we disclose the assets that we direct to sub-advisers under client mandate?"

Guptar: "Yes, unfortunately, the GIPS require that the firm include as total assets under management those assets managed by client-appointed sub-advisers."

- i. Regarding Excerpt 1 is Tribon correct or incorrect? If incorrect, **explain** why.
 - ii. Regarding Excerpt 2 is Guptar correct or incorrect? If incorrect, **explain** why.
 2. In July 20X7, Edith Poloski, Jason Masserelli, and Rajesh Granta formed PMG Investment Management (PMG). Poloski has considerable experience in the area of security analysis, and Masserelli and Granta have expertise in fixed income and equity portfolio management, respectively.
- Initially, PMG exclusively managed the portfolios of high-net-worth individuals with a minimum investment requirement of \$3 million. However, recently, PMG has decided to broaden its client base by lowering its minimum investment requirement. To attract new clients and improve the information that its current clients receive, PMG has prepared a performance presentation that reflects the results of its major investment styles. Performance results are presented for a fixed income, an equity, and a balanced composite. The following list contains the actions that PMG took when preparing its current performance presentation. For each of the actions, choose whether the action is in compliance (Choice A) or not in compliance (Choice B) with

the GIPS standards. If not in compliance with the GIPS standards, **explain** why.

Action 1: The S&P 500 index was used as the benchmark for comparison with all three composite styles.

A. In compliance with the GIPS standards.

B. Not in compliance with the GIPS standards.

If not in compliance with the GIPS standards, **explain** why.

Action 2: PMG used accrual accounting, and book values are used for computations of fixed-income returns.

A. In compliance with the GIPS standards.

B. Not in compliance with the GIPS standards.

If not in compliance with the GIPS standards, **explain** why.

Action 3: For fixed-income return calculations, accrued income is included.

A. In compliance with the GIPS standards.

B. Not in compliance with the GIPS standards.

If not in compliance with the GIPS standards, **explain** why.

Action 4: Due to the change in the firm's client base, PMG did not include its fee schedule.

A. In compliance with the GIPS standards.

B. Not in compliance with the GIPS standards.

If not in compliance with the GIPS standards, **explain** why.

Action 5: Asset-weighted composite returns were calculated using end-of-period weightings.

A. In compliance with the GIPS standards.

B. Not in compliance with the GIPS standards.

If not in compliance with the GIPS standards, **explain** why.

Action 6: All composites included only assets under management and were not linked with simulated or model portfolio performance.

A. In compliance with the GIPS standards.

B. Not in compliance with the GIPS standards.

If not in compliance with the GIPS standards, **explain** why.

Action 7: Equal-weighted rates of return that adjust for cash flows are used for portfolio returns.

A. In compliance with the GIPS standards.

B. Not in compliance with the GIPS standards.

If not in compliance with the GIPS standards, **explain** why.

Action 8: Performance calculations were made after the deduction of actual trading expenses.

A. In compliance with the GIPS standards.

B. Not in compliance with the GIPS standards.

If not in compliance with the GIPS standards, **explain** why.

3. If a security does not have an observable, quoted market price available from an active market, the next *best* valuation basis, according to the GIPS valuation hierarchy, is:

A. subjective, unobservable inputs.

B. observable market-based inputs other than quoted prices.

C. quoted prices from an inactive market for the same or a similar security.

MODULE 15.7: GIPS VERIFICATION



Video covering this content is available online.

LOS 15.k: Discuss the purpose, scope, and process of verification.

Verification can be characterized as the process whereby an independent, outside party assesses the firm's:

- Policies and procedures for composite or pooled fund construction and maintenance.
- Performance calculation.
- Performance presentation.
- Distribution of performance.

The purpose of verification is to provide greater confidence to investors and to the firm in its claim of GIPS compliance. Verification is based on the GIPS principle of fair presentation and full disclosure. Verification, however, does not assure that the construction, calculation, and presentation for any particular portfolio or composite is accurate. Although not required, verification is recommended and consistent with best practices.

The Benefits of Verification to the Firm

Besides providing confidence in its claim of GIPS compliance, other benefits to the firm from GIPS verification include:

- Increased knowledge of performance presentation personnel.
- Better quality presentations.
- Better internal processes and procedures.
- Possible marketing benefits.

Selecting a GIPS Verifier

A firm should consider its operations, products, and needs when choosing a verifier. For example, the needs of the following pairs of firms will differ and as a result, the best verifier for each may differ:

- A large global firm versus a small local firm.
- A tax exempt investor (e.g., a pension fund) versus a firm that focuses on managing portfolio taxes.
- A quantitative manager utilizing derivatives versus a direct real estate investor.

A firm should request that potential verifiers provide the following information:

- A description of the verifier including its personnel and organizational structure.
- Services offered and previous projects completed.
- The verifier's project management, sampling, and testing procedures.
- References from previous clients.
- Fees, proposal, and timeline.

The Scope of GIPS Verification

Verification must be carried out in accordance with the GIPS Standards for Verifiers and must be issued firmwide. Verification cannot be provided for just a single portfolio, composite, or pooled fund. A firm cannot say that a portfolio, fund, or strategy is “in compliance.” Verification can only be claimed for the entire firm. A firm must meet all the requirements of GIPS, it cannot claim that it is in compliance “except for.”



PROFESSOR'S NOTE

Once again, as in the reading earlier, we see that GIPS can't be halfway or partway. Verification can only be claimed for an entire firm, not just part of it.

However, a firm can have the verifier perform a detailed performance examination on one or more composites or pooled funds and then state that a performance examination has been issued on that specific composite or fund.

The GIPS Verification Process

The GIPS Standards for Verifiers provides the various procedures that verifiers must follow. The reading focuses on the planning, sample selection, and testing components of verification. In planning for the verification process, the verifier must gather information about the firm, including all the firm's products, calculation methodologies, and GIPS policies and procedures.

Although verification must be asserted on a firmwide basis, verifiers often use samples of the firm's products to do so. When choosing samples, the verifier must consider the size of the firm and composites, the firm's internal controls and methods, the number of years being verified, and other factors. If the verifier discovers deficiencies, larger samples or additional verification procedures may be necessary.

Verifiers should also perform testing to determine if the firm satisfies requirements in areas including the following:

- Recordkeeping.
- Policies and procedures.
- Firm definition.
- The thoroughness of the firm's list of composites and limited distribution pooled funds.
- Calculation of total firm assets.
- Input data such as portfolio inflows and outflows.
 - These can often be verified with custodial statements and other third party documents.
- The construction and maintenance of composites including:
 - The classification of portfolios as discretionary or nondiscretionary.
 - The assignment of portfolios to appropriate composites.

- Portfolios with outlier returns may indicate calculation errors or a misassignment to a composite.
- The content of the firm's GIPS Report and any marketing material.



MODULE QUIZ 15.7

1. Which of the following statements regarding verification is *least accurate*?
Verification is:
 - A. voluntary.
 - B. recommended as part of best practices.
 - C. a requirement and noted as part of a GIPS compliant presentation.
2. Which of the following statements regarding verification is *most accurate*?
 - A. The verification process includes a detailed analysis of all the firm's products.
 - B. Verification can be provided for a single portfolio, composite, or pooled fund.
 - C. Verification does not assure that the construction, calculation, and presentation for any particular portfolio or composite is accurate.

KEY CONCEPTS

LOS 15.a

The Global Investment Performance Standards (GIPS®) contain ethical and professional standards for the presentation of investment performance results. The GIPS are a voluntary set of standards.

The LOS focus on the standards for investment management firms.

Asset owners who manage assets for an organization, participants, or beneficiaries and compete for business would also use the GIPS standards for firms.

The objectives of GIPS are to:

- Advance the interests of investors and increase their confidence in the investment industry.
- Provide accurate and comparable data to investors.
- Create a globally accepted standard for the determination and presentation of investment performance.
- Facilitate fair competition among global investment managers.
- Encourage self-regulation in the global investment industry.

The scope of the GIPS standards is as follows:

- GIPS compliance can only be claimed on a firmwide basis.
- To claim GIPS compliance, a firm must comply with all, not just some, of the applicable GIPS standards requirements.
- A claim of GIPS compliance indicates, among other things, that:
 - A firm's data inputs, processes, and return calculations are compliant.
 - All the firm's fee-paying segregated accounts and limited-distribution pooled funds have been assigned to at least one composite.

Definition of the Firm

- A firm is held out to clients or potential clients as a distinct business entity.
- A distinct business entity is that which is separated from other parts of the firm and retains discretion over asset management.
- Judgment is required to determine what qualifies as a distinct business entity.

The definition of the firm is used to determine the fair value of total firm assets, which for the defined firm:

- include discretionary and nondiscretionary assets.
- include fee-paying and non-fee-paying assets.
- are net of leverage used.
- are only actual (not simulated) assets.
- exclude advisory-only assets.
- exclude uncalled, but committed, capital.

Other Compliance Fundamentals

- When calculating composite assets (not total firm assets), nondiscretionary assets are not included, (i.e., only include discretionary assets when calculating composite performance).
- To initially claim compliance with the GIPS standards, the firm must attain compliance for a minimum of five years or for the period since firm inception if the firm has been in existence for less than five years.
- Firms must establish, update, and document GIPS policies and procedures.
- If the GIPS standards conflict with local laws and regulations, the firm must comply with local laws and regulations and disclose the conflict.
- The firm must not present performance-related information that is false or misleading.
- The firm should provide an annual GIPS compliant report to all existing clients for relevant composites.
- Benchmarks must reflect the corresponding investment strategy and be total return benchmarks.
- The firm must disclose all material errors and disclose corrected reports to current clients and verifiers.
- The firm must maintain GIPS compliance data and a list of composites for the last five years.

LOS 15.c

GIPS requires comparable return calculation methods to facilitate comparison of results. In many cases, there are interim external cash flows (ECF), such as client withdrawals (outflows) or additional client contributions (inflows) that can distort return calculations.

Ideally, to eliminate these potential distortions, the investment would be valued each time an interim ECF occurs. The subperiod returns must then be geometrically linked to create a true time-weighted rate of return (TWRR):

$$R_{\text{TWRR}} = (1 + R_1) \times (1 + R_2) \times (1 + R_3) \times \dots \times (1 + R_t)$$

The methods of calculating an approximate return that do not require interim valuations are the Modified Dietz and MIRR methods.

$$\text{Modified Dietz return: } R_{\text{MD}} = \frac{\text{EV} - \text{BV} - \text{ECF}}{\text{BV} + \text{adjusted ECF}}$$

The modified internal rate of return (MIRR) is simply an internal rate of return (IRR) that adjusts for the timing of the ECFs.

Since both the Modified Dietz and MIRR use the number of days in the month, they are said to be methods that adjust for daily-weighted ECFs. The Modified Dietz and MIRR typically provide similar values.

Under the GIPS requirements:

- Firms must calculate monthly returns for non-private market investment portfolios.
- If a firm calculates daily valuations and returns, the daily return must be geometrically linked to create a monthly true TWRR.
- If a firm does not calculate daily returns and the ECFs are not large, approximations to the true TWRR that do not require an interim valuation can be used.
- If the ECFs are large, the portfolio must be valued at the time of the ECFs to calculate a subperiod return.
- Regardless of how the monthly return is calculated, the monthly return must be geometrically linked to create an annual return.

For portfolios other than non-private market investment portfolios, the GIPS requirements are as follows:

- Private market investment portfolios values and returns must be calculated quarterly.
- Pooled funds not in a composite must be valued and returns calculated at least annually.
 - The fund must also be valued and a subperiod return calculated at the time of subscriptions or redemptions.

Large Cash Flows

- The definition of a large ECF is determined by each firm for each composite.
- Generally, a large ECF is large enough to affect the return calculation.
- The firm's policy for the determination of a large cash flow must be documented.

There are some investment strategies where the firm controls the timing and size of the ECFs. In these cases, a money-weighted return (MWR) will be more representative of the manager's skill than the TWRR. MWRs can be used instead of TWRRs if:

- The firm has control of the timing of ECFs.

- The portfolios are closed-end, or fixed life, or fixed commitment, or have a significant amount of illiquid assets.

The MWR (which is an IRR calculation) must be calculated and the portfolios valued at least annually.

Other return calculation requirements are as follows.

- Trade date, not settlement date, prices must be used to calculate returns.
- Partial-year returns cannot be annualized.
- Total returns, which include income and capital gains/losses, must be used.
 - For investments that generate income, such as bonds, accrual accounting must be used.
 - Returns must reflect the manager's allocations to cash and cash equivalents.
- Under GIPS, the presented gross-of-fees return must have been calculated after the deduction of transactions costs.
- Transactions costs reflect the costs of buying and selling securities.
 - Examples include brokerage commissions, spreads, exchange fees.
 - For private market investments, they can also include legal, advisory, and other fees.
 - Custody fees should not be included.
 - Transactions costs can be estimated but only if they are unknown.
- In some cases, portfolios pay bundled or all-in fees, which can include trading costs, as well as investment management, custody, administrative, and other fees.
 - In this case, the presented gross-of-fees return must be reduced by:
 - The portion of the bundled fee due to transactions costs; or
 - The entire bundled fee if the transactions costs cannot be separated out.

LOS 15.d

Fair value is the amount an asset would be sold in an arm's-length transaction between willing and knowledgeable parties.

- Fair value should include accrued income for bonds and other income-generating assets.
 - For cash, income may be accounted for on a cash or accrual basis.
- Firms must document their valuation process and methodologies, which should be composite- or pooled fund-specific.
- A method lower in the GIPS recommended valuation hierarchy is used only when all methods higher in the hierarchy are unavailable. The fair value hierarchy is:
 1. The quoted price for an identical asset in a liquid market on the same day.
 2. The quoted price for a similar asset in a liquid market on the same day.
 3. The quoted price for identical or similar assets in markets that are not active.

4. A value based on market inputs.
5. A subjective value that is unobservable.

LOS 15.e

Composite returns must be calculated in one of three ways:

1. Asset-weighting portfolio returns by beginning-of-period values.
2. Asset-weighting portfolio returns by both beginning-of-period values and ECFs.
3. The aggregate method.

The first method is perhaps the simplest as each portfolio return is just multiplied by its beginning of period weight. The second method is similar except that we also adjust for the ECFs. The third method uses total composite values at the beginning and end of period.

LOS 15.f

Composites must be constructed so that investors are provided a fair and accurate representation of manager performance. The requirements should prevent managers from excluding poorly performing portfolios from composites.

A key determinant in whether a portfolio is included in a composite is whether the manager has discretion. If the performance of a portfolio does not reflect a manager's decisions (i.e., the portfolio is nondiscretionary), then that portfolio would be excluded from the calculation of composite returns.

Generally speaking, the requirements for what must be included in at least one composite are as follows:

- All actual, fee-paying, discretionary segregated accounts.
- Pooled funds that are also offered as segregated accounts.

In general, the requirements for what must not be included in a composite are as follows:

- Nondiscretionary accounts.
- Pooled funds that are not also offered as segregated accounts.
- Simulated portfolios.

Non-fee-paying, discretionary segregated accounts may be included with additional disclosures.

Discretion

- Given its importance, a firm must maintain and apply a clear, written definition of discretion.
- A client's investment policy statement (IPS) will specify risk preferences and constraints.
 - However, none of these *automatically* make a portfolio nondiscretionary.
 - Guidance is based on if the manager's ability to use professional judgment is materially constrained.

- If the constraint is deemed immaterial, the manager can:
 - Place the portfolio in a composite with similar, unconstrained portfolios.
- If the constraint is deemed material, the manager should:
 - Group the portfolio with similar, constrained portfolios.
 - Exclude the portfolio from all composites.
- In some cases, there may be restrictions for particular assets. In these cases, a manager may:
 - Consider the entire portfolio nondiscretionary; or
 - Remove these assets and place the remainder of the portfolio in a composite; or
 - Consider the entire portfolio discretionary if the restricted assets are below a certain percentage of the portfolio, as stated in their policy.
- In some cases, its ECFs might indicate that a portfolio is nondiscretionary.

Model Portfolios

- Simulated portfolios cannot be in a composite.
- These portfolios are called hypothetical, model, or theoretical portfolios.
- They are often based on the backtesting of data.
- Their performance can be provided in supplemental information, but not in composite results.
- However, sometimes a firm will use its own funds (seed money) to create a new strategy.
 - The performance for these actual portfolios can be included in existing or new composites.

Non-Fee-Paying Portfolios

- Non-fee-paying portfolios may be included in a composite but, if included, firms are required to disclose the percentage of composite assets represented by non-fee-paying portfolios.

LOS 15.g

A critical step in achieving an accurate and comparable representation of a firm's performance is the defining and construction of composites. As per the GIPS standards, composites must:

- Be determined by investment mandate, objective, or strategy.
- Contain all portfolios that match the composite definition.
- Be based on criteria that is documented in the firm's policies and procedures.
- Be defined such that clients are able to compare the performance of one firm to another.
- Be representative of the firm's products and be consistent with the firm's marketing strategy.

Regarding composite construction:

- A starting point in composite construction might be competitors' composite classifications and/or the styles requested by potential investors.
- A composite definition that is too narrow results in too few portfolios in each, creates unnecessary costs, and potentially jeopardizes client confidentiality.
- A composite definition that is too broad results in disparate performance among composite portfolios.
- Examples on which to base composite construction include:
 - Style; sector, strategy, benchmark, risk/return profile, etc.

LOS 15.h

Regarding the movement of portfolios in and out of composites, the GIPS standards require firms to have policies for:

- When portfolios are included in composites.
- When portfolios are excluded from composites.
- Switching a portfolio from one composite to another.
- Cash flows from new investments or liquidations.
- The minimum asset level for a composite.

The firm's policy should be established on a composite-by-composite basis and applied in a timely, consistent manner.

Portfolio Inclusion

- New portfolios should be included in a composite at the beginning of the next full measurement period.
- However, the firm has discretion on the timing of portfolio inclusion because it may take time to invest new funds if the funding is other securities or if illiquid markets are being invested in.
- Thus the firm's documented policy may vary by composite, with some composites allowing for longer periods before portfolio inclusion.

Portfolio Exclusion

- Terminated portfolios should be included in a composite through the last full measurement period in which the firm had discretion.
- Clients sometimes direct a firm to stop trading an account or transfer control to a new manager before the portfolio is fully liquidated.

Switching Portfolios

- A portfolio can be switched to a new composite due to actions by the client or by the firm.
 - A client may change the portfolio's mandate, objective, or strategy.
 - The firm may redefine the composite such that the portfolio is no longer appropriate for the composite.

- Redefining a composite by a firm should be highly unusual.
- When a portfolio is switched to a new composite, the portfolio's performance must remain in the old composite's historical performance.

Significant Cash Flows

- Significant (as defined in the firm's documentation) cash flows are those large enough such that it impedes the firm from implementing the strategy on a timely basis.
- To prevent composite performance from being affected by cash inflows/outflows in the event of significant cash flows, a firm can temporarily exclude the portfolio from the composite or create and report on a temporary new account (outside of the composite).

Minimum Asset Levels

- As portfolios change in size, they may be added to or removed from a composite as per firm policy.
- The minimum asset level must be specified in advance, and portfolios that are removed cannot have their prior performance removed from the composite's historical record.

LOS 15.i, 15.j

GIPS requires that firms must make every reasonable effort to provide a GIPS report to prospective clients and limited-distribution pooled fund investors.

The requirements for Composite Time-Weighted Return Reports include the following.

- At least 5 years of performance history upon GIPS adoption:
 - Unless the firm has been in existence for less than 5 years.
 - And then extended each year until the firm builds a 10-year GIPS compliant history.
- Time-weighted returns for the composite and benchmark.
- The amount of firm assets.
- The amount of composite assets.
- The number of portfolios in the composite if there are six or more.
- Internal composite dispersion to show how consistent portfolio performance is within the composite.
 - The firm can choose which measure to use as long as it fairly represents the composite's internal dispersion.
- Historical dispersion for the benchmark and the composite as a whole, using the *ex post* standard deviation, which must be:
 - For the previous three years of data on an annualized basis.

Portability

When one firm acquires or joins with another firm, group of managers, or manager, the new firm can link their performance to the previous firm's historical performance if:

1. Substantially all the investment decision makers are retained by the new firm.
2. The decision-making process remains substantially intact and independent within the new firm.
3. The new firm has records that document the previous firm's historical performance.
4. There is no break in the performance record between the new and previous firm.

If only the first three conditions are met, then the previous firm's historical performance can be used to represent that of the new firm, but the records may not be linked.

If the new firm is GIPS compliant but the previous firm is not, then the new firm has one year to bring its assets into compliance for future reporting.

Advisory-Only Assets and Uncalled, But Committed, Capital

- The firm can report information on advisory-only assets and uncalled, but committed, capital on a separate basis or combined with composite or firm assets.
- If reported on a combined basis, the firm must also report on that for the advisory-only and for the uncalled, but committed, assets.

LOS 15.k

The purpose of verification is to provide greater confidence to investors and to the firm in its claim of GIPS compliance. Verification is based on the GIPS principle of fair presentation and full disclosure. Although not required, verification is recommended and consistent with best practices.

Verification can be characterized as the process whereby an independent, outside party assesses the firm's:

- Policies and procedures for composite or pooled fund construction and maintenance.
- Performance calculation.
- Performance presentation.
- Distribution of performance.

Verification must be carried out in accordance with the GIPS Standards for Verifiers and must be issued firmwide.

- Verification cannot be provided for just a single portfolio, composite, or pooled fund.
- A firm must meet all the requirements of GIPS; it cannot claim that it is in compliance "except for."
- However, a firm can have the verifier perform a detailed performance examination on one or more composites or pooled funds and then state that a performance examination has been issued on that specific composite or fund.

The GIPS Standards for Verifiers provides the various procedures that verifiers must follow, which include planning, sample selection, and testing.

In planning for the verification process, the verifier must gather information about the firm, including all the firm's products, calculation methodologies, and GIPS policies and procedures.

Although verification must be asserted on a firmwide basis, verifiers often use samples of the firm's products to do so.

- When choosing samples, the verifier must consider the size of the firm and composites, the firm's internal controls and methods, the number of years being verified, and other factors.
- If the verifier discovers deficiencies, larger samples or additional verification procedures may be necessary.

Verifiers should also perform testing to determine whether the firm satisfies requirements in areas including the following:

- Recordkeeping.
- Policies and procedures.
- Firm definition.
- The thoroughness of the firm's list of composites and limited distribution pooled funds.
- Calculation of total firm assets.
- Input data such as portfolio inflows and outflows.
- The construction and maintenance of composites, including:
 - The classification of portfolios as discretionary or nondiscretionary.
 - The assignment of portfolios to appropriate composites.
 - Portfolios with outlier returns may indicate calculation errors or a misassignment to a composite.
- The content of the firm's GIPS Report and any marketing material.

ANSWER KEY FOR MODULE QUIZZES

Module Quiz 15.1, 15.2, 15.3

1. GIPS require the returns from cash and cash equivalents held in portfolios must be included in total-return calculations as long as the portfolio manager has control over the amount of the portfolio allocated to cash. This requirement stands even if the manager does not actually invest the cash, as is the case when it is held in a money market sweep account. This would not be an acceptable practice. (Module 15.3, LOS 15.c)
2. GIPS require periodic returns to be geometrically linked. Thus, the annual return is computed as follows:

$$R_{\text{annual}} = [(1 + R_{Q1}) \times (1 + R_{Q2}) \times (1 + R_{Q3}) \times (1 + R_{Q4})] - 1 =$$

$$[(1.0300)(1.0415)(1.0375)(1.0315)] - 1 = 14.8\%.$$

(Module 15.3, LOS 15.c)

3. JIM may not claim compliance with the GIPS. A firm must be in full compliance with the GIPS in order to claim GIPS compliance. There is no such thing as *partial* compliance under the GIPS.

(Module 15.1, LOS 15.a)

4. (a) The Modified Dietz method is calculated as:

$$\begin{aligned}
 R_{\text{MDietz}} &= \frac{\text{EMV} - \text{BMV} - \text{CF}}{\text{BMV} + \sum_{i=1}^n W_i \times \text{CF}_i} \\
 &= \frac{55 - 50 - 3}{50 + \left(\frac{20}{30} \times 5\right) + \left(\frac{10}{30} \times (-2)\right)} \\
 &= 3.80\%
 \end{aligned}$$

- (b) The exact TWRR values the portfolio at every ECF.

The month divides into three periods:

period 1 return = $(51.5 - 50.0) / 50 = 1.5 / 50 = 3.00\%$

period 2 return = $(59.0 - 56.5) / 56.5 = 2.5 / 56.5 = 4.42\%$

period 3 return = $(55.0 - 57.0) / 57.0 = -2 / 57.0 = -3.51\%$

geometric linking for the month = $(1.0300 \times 1.0442 \times 0.9649) - 1 = 3.78\%$

(Module 15.3, LOS 15.c)

5. C It is most likely that money-weighted returns could be used instead of time-weighted returns if the manager has control of the timing of ECFs. The portfolios must also be closed-end, or fixed life, or fixed commitment, or have a significant amount of illiquid assets. (LOS 15.b)

Module Quiz 15.4

1. All actual fee-paying discretionary portfolios must be included in at least one composite. This requirement prevents firms from *cherry-picking* their best performing portfolios for presentation purposes. It does not matter if the firm ever plans to market the particular strategy to which a portfolio is being managed; if the portfolio is fee-paying and discretionary, it must be included in a composite. (LOS 15.e)
2. TIM cannot include model performance results in its presentation and claim compliance with the GIPS. Composites must include only assets under management and may not link simulated or model portfolios with actual performance. Simulated, back-tested, or model portfolio results do not represent the returns of actual assets under management and, thus, may not be included in the composites' GIPS-compliant performance results. The model results must be presented as simulated rather than real assets. (LOS 15.e)

Characteristic	A. May Be Included in a Composite	Explanation*
	B. Must Be Excluded From Composite	
3. i. Client has significant liquidity needs with an accompanying significant cash position.	B. Must be excluded	With both a significant liquidity requirement and cash position, <i>the manager's actions are limited to the point that the portfolio would probably not qualify as discretionary and thus should not be included.</i>
ii. Client does not pay fees.	B. May be included	Fee-paying portfolios are required to be in a composite. <i>Non-fee-paying portfolios that are discretionary may be included.</i>
iii. Client requests strictly following an index.	B. Must be excluded	<i>If the client significantly restricts a manager's ability to implement their investment strategy, then the portfolio is likely nondiscretionary and must be excluded from a composite.</i>

*Italics indicate an answer that would be sufficient for the exam.

(LOS 15.f)

4. The GIPS require terminated portfolios to be included in the historical record of the appropriate composite(s) through the last full reporting period that the portfolio was under management. This prevents the inclusion of the returns from a terminated portfolio for partial periods in a composite's return. Also, retaining the performance of a terminated portfolio in a composite's historical performance avoids survivorship bias. In the case of JIM, the terminated portfolio should be included in the composite until June 30 (i.e., the end of the month preceding July 15). (LOS 15.g)
5. (a) The adjustments to the ECFs result in partial month weightings (W) of each cash flow as follows:

Portfolio	ECF	Weight (W)	Adjusted ECF
A	£25	$(30 - 12) / 30 = 18/30$	$18 / 30 \times £25 = £15$
A	£10	$(30 - 22) / 30 = 8/30$	$8 / 30 \times £10 = £2.67$
B	-£13	$(30 - 20) / 30 = 10/30$	$10 / 30 \times -£13 = -£4.33$

Using these in the formula for the Modified Dietz return (R_{MD}):

$$\text{Portfolio A: } R_{MD} = \frac{£467 - £400 - £25 - £10}{£400 + £15 + £2.67} = \frac{£32}{£417.67} = 7.66\%$$

$$\text{Portfolio B: } R_{MD} = \frac{£224 - £200 - -£13}{£200 - £4.33} = \frac{£37}{£195.67} = 18.91\%$$

- (b) To calculate the composite return using beginning of period values, first find the weights of each portfolio in the composite:

$$A: \frac{400}{600} = 66.67\%$$

$$B: \frac{200}{600} = 33.33\%$$

The composite return is the sum of the weights times the returns:

$$= 0.6667 \times 7.66\% + 0.3333 \times 18.91\%$$

$$= 5.1069\% + 6.3027\% = 11.41\%.$$

- (c) To factor in the beginning values and weighted cash flows, the total for the denominators of the Modified Dietz formula is:

$$£417.67 + £195.67 = £613.34$$

Using these figures, the weights are:

$$A: \frac{417.67}{613.34} = 68.1\%$$

$$B: \frac{195.67}{613.34} = 31.9\%$$

The composite return is the sum of the weights times the returns:

$$= 0.681 \times 7.66\% + 0.319 \times 18.91\%$$

$$= 5.2165\% + 6.0323\% = 11.25\%$$

Notice that under this method, the composite return is slightly lower than in the previous method. This is because Portfolio A had a lower return (7.66%) than Portfolio B (18.91%). The larger ECFs for Portfolio A gave it a larger weight in this method and hence this reduced the overall composite return to 11.25%.

- (d) In the aggregate return method, the numerator uses the total of the portfolio values and cash flows from the bottom of the table. In the denominator, the total of the portfolios' Modified Dietz values from the previous method are used.

$$R_{MD} = \frac{£691 - £25 - (-£13) - £10 - £600}{£613.34} = \frac{£69}{£613.34} = 11.25\%$$

(Module 15.3, LOS 15.c; Module 15.4, LOS 15.e)

Module Quiz 15.5, 15.6

1. Part i

Excerpt 1 Tribon: I seem to recall that the GIPS require firms to present performance on a net of management fees basis.

Incorrect. Under the GIPS, firms may present performance net or gross of fees. The GIPS do require firms to disclose whether performance results are calculated gross or net of investment management and other fees paid by clients to the firm or to the firm's affiliates.

Part ii.

Excerpt 2 Gupta: GIPS require that the firm include as total assets under management those assets managed by client-appointed sub-advisers.

Incorrect. Total firm assets include all discretionary and non-discretionary assets under management within the defined firm. They do not include assets assigned to a sub-adviser unless the firm has discretion over the selection of the sub-adviser. (Module 15.5, LOS 15.i)

2.

Action Numbers not in compliance, Answer Choice B.	Explanation of Why Action is Not GIPS Compliant
1	The total return for the benchmark (or benchmarks) that reflects the investment strategy or mandate represented by the composite must be presented for the same periods for which the composite return is presented. The S&P 500 Index should not be used as a benchmark for the fixed-income and balanced composites.
2	Portfolio valuations must be based on fair values (not cost basis or book values).
4	The GIPS requires the disclosure of an appropriate fee schedule.
5	Composites must be asset-weighted using beginning-of-period weightings or another method that reflects both beginning market value and cash flows.
7	Time-weighted rates of return that adjust for cash flows must be used. Periodic returns must be geometrically linked.

Actions 3, 6, and 8 are in compliance with GIPS, Answer Choice A. (LOS a–e, i)

3. C The GIPS valuation hierarchy is as follows:

1. Quoted prices from an active market for the same or a similar security.
2. Quoted prices from an inactive market for the same or a similar security.
3. Observable market-based inputs other than quoted prices.
4. Subjective, unobservable inputs.

Based on this hierarchy, if observed market prices from an active market are not available, the next best valuation basis is to use quoted prices from an inactive market. (Module 15.6, LOS 15.d)

Module Quiz 15.7

1. **C** Verification is voluntary and recommended as part of best practices. If verification were performed, it would be noted as part of the GIPS compliant performance presentation report. (LOS 15.k)
2. **C** Verification does not assure that the construction, calculation, and presentation for any particular portfolio or composite is accurate. Verifiers often use samples of the firm's products to determine if the firm is following the GIPS Standards. Verification must be issued firmwide and cannot be provided for a single portfolio, composite, or pooled fund. A detailed *performance examination* can be done on one or more composites or pooled funds with the firm issuing a statement indicating a performance examination has been issued on that specific composite or fund. (LOS 15.k)

¹ CFA Program 2025. Core Curriculum, Volume 3, Performance Measurement, Level III.

TOPIC QUIZ: PERFORMANCE MEASUREMENT

You have now finished the Performance Measurement topic section. On your Schweser online dashboard, you can find a Topic Quiz that will provide immediate feedback on how effective your study of this material has been. The test is best taken timed; allow three minutes per question. Topic Quizzes are more exam-like than typical QBank questions or module quiz questions. A score less than 70% suggests that additional review of the topic is needed.

FORMULAS

Herfindahl-Hirschman index (HHI): $HHI = \sum_{i=1}^n w_i^2$

effective number of stocks = $\frac{1}{HHI}$

Expected Return is the sum of:

1. Coupon income: annual coupon amount / current bond price
2. Rolldown return: (projected ending bond price (BP) – beginning BP) / beginning BP; based on no change in the yield curve
3. Price change due to investor's benchmark yield change predictions: $(-MD \times \Delta Y) + (\frac{1}{2} \times C \times \Delta Y^2)$
4. Price change due to investor's spread change predictions: $(-MD \times \Delta S) + (\frac{1}{2} \times C \times \Delta S^2)$
5. Currency gain or loss: projected change in value of foreign currencies weighted for exposure to the currency

Rolling yield = coupon income + rolldown return

r_p = portfolio return (amount) / portfolio equity

Return for a leveraged portfolio: $r_I + [(V_B / V_E) \times (r_I - r_B)]$

where:

r_p = return on portfolio

r_I = return on invested assets

r_B = rate paid on borrowings

V_B = amount of leverage

V_E = amount of equity invested

leverage = (notional value of contract – margin amount) / margin amount

Rebate rate = collateral earnings rate – security lending rate

The change in the market value of equity for banks and insurers:

$$\% \Delta E = \% \Delta A(M) - \% \Delta L(M - 1)$$

where:

$\% \Delta E$ = percentage change in the value of equity

$\% \Delta A$ = percentage change in the value of assets

$\% \Delta L$ = percentage change in the value of liabilities

M = leverage multiplier, A / E

The duration of the equity of a bank or insurer:

$$D_E = D_A(M) - D_L(M - 1) \left(\frac{\Delta i}{\Delta y} \right)$$

where:

D_E = modified duration of the institution's equity capital

D_A = modified duration of the institution's assets

D_L = modified duration of the institution's liabilities

M = leverage multiplier, A / E

$\frac{\Delta i}{\Delta y}$ = estimated change in yield of liabilities, i , relative to a unit change in yield of assets, y

The expected volatility (i.e., standard deviation) of the percentage change in the market value of equity capital for a bank or insurer:

$$\sigma_E^2 = M^2 \sigma_A^2 + (M - 1)^2 \sigma_L^2 - 2(M)(M - 1) \sigma_A \sigma_L \rho_{AL}$$

where:

σ_E = standard deviation of percentage change in the market value of equity

σ_A = standard deviation of percentage change in the value of assets

σ_L = standard deviation of percentage change in the value of liabilities

M = leverage multiplier, A / E

ρ_{AL} = correlation of percentage value changes in assets and liabilities

Effective spread transaction cost estimate = (side) $\times$ (transaction price – midquote price)

where:

side = +1 for buy orders and –1 for sell orders

effective spread = $2 \times$ (effective spread transaction cost)

VWAP transaction cost = trade size $\times$ (side) $\times$ (trade VWAP – benchmark VWAP)

Allocation effect BHB model—the contribution to the i th sector is equal to the portfolio's sector weight minus the benchmark's sector weight, times the benchmark sector return: $A_i = (w_i - W_i)B_i$

Allocation effect Brinson-Fachler model—the contribution to the i th sector is equal to the portfolio's sector weight minus the benchmark's sector weight, times the benchmark sector return minus the overall benchmark return: $A_i = (w_i - W_i)(B_i - B)$

Security selection—the contribution to selection in the i th sector is equal to the benchmark sector weight times the portfolio's sector return minus the benchmark's sector return: $S_i = W_i(R_i - B_i)$

Interaction effect—the contribution to the i th sector is equal to the portfolio sector weight minus the benchmark sector weight, times the portfolio sector return minus the benchmark sector return: $I_i = (w_i - W_i)(R_i - B_i)$

Carhart model:

$$R_p - R_f = a_p + b_{p1}RMRF + b_{p2}SMB + b_{p3}HML + b_{p4}WML + E_p$$

where:

RMRF = portfolio's sensitivity to a market index

SMB = market capitalization factor

HML = book-to-price factor

WML = momentum factor

For fixed income:

% total return = % income return + % price return

where:

% price return $\approx$ -duration $\times$ change in YTM

Factor-model-based benchmark:

$$R_p = a_p + b_1F_1 + b_2F_2 + \dots + b_KF_K + \varepsilon$$

where:

R_p = periodic return on an account

a_p = "zero factor" term, representing the expected value of R_p if all factor values were zero

F_i = factors that have a systematic effect on the portfolio's performance;
 $i = 1$ to K

b_i = sensitivity of the returns on the account to the returns generated from factor i

ε = error term; portfolio return not explained by the factor model

Benchmark quality of a portfolio:

$$P = M + S + A$$

where:

P = investment manager's portfolio return

M = return on the market index

$S = B - M$ = excess return to style; difference between the manager's style index (benchmark) return and the market return— S can be positive or negative

$A = P - B$ = active return; difference between the manager's overall portfolio return and the style benchmark return

Sharpe ratio:

$$S_A = \frac{\bar{R}_A - \bar{r}_f}{\hat{\sigma}_A}$$

Treynor ratio:

$$T_A = \frac{\bar{R}_A - \bar{r}_f}{\hat{\beta}_A}$$

Information ratio:

$$IR = \frac{E(r_p) - E(r_B)}{\sigma(r_p - r_B)}$$

Appraisal ratio:

$$AR = \frac{\alpha}{\sigma_\varepsilon}$$

Sortino ratio:

$$SR_D = \frac{E(r_p) - r_T}{\sigma_D}$$

$$\widehat{SR}_D = \frac{\bar{r}_p - \bar{r}_T}{\hat{\sigma}_D}$$

Capture ratios are calculated as portfolio return divided by benchmark return. The capture ratio is calculated as upside capture divided by downside capture.

$$R_{TWRR} = (1 + R_1) \times (1 + R_2) \times (1 + R_3) \times \dots \times (1 + R_t)$$

$$R_{MD} = \frac{EV - BV - ECF}{BV + \text{adjusted ECF}}$$

Future value based on an after-tax return:

$$FV = [1 + R(1 - t_x)]^T$$

Future value incorporating capital gains:

$$FV = (1 + R)^T - [(1 + R)^T - 1] \times t_{cg}$$

$$FV = (1 + R)^T(1 - t_{cg}) + t_{cg}$$

Future value incorporating capital gains and basis:

$$FV = (1 + R)^T(1 - t_{cg}) + t_{cg} - (1 - B) \times t_{cg}$$

$$FV = (1 + R)^T(1 - t_{cg}) + B \times t_{cg}$$

Impact of inflation

$$FV_{\text{inf, after tax}} = \text{Nominal after-tax value} / (1 + \text{infl})$$

Time-weighted rate of return (TWRR):

$$R_{TWRR} = (1 + R_1) \times (1 + R_2) \times (1 + R_3) \times \dots \times (1 + R_t) - 1$$

Modified Dietz return: $R_{MD} = \frac{EV - BV - ECF}{BV + \text{adjusted ECF}}$

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